Revisiting the trends in global inequality

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Abstract: I analyse the trends in the global income distribution (for 1950-2020, with projections until 2027) using a new companion WIID dataset with standardized country income percentiles. I investigate whether these trends depend on specific distributive views (such as absolute versus relative inequality, and the relative emphasis on the bottom versus on the top), as well as on key data choices. The results show an unambiguous increase of absolute inequality, along a more nuanced trend in relative inequality, with a highly robust decline after 2000 that was interrupted by the COVID crisis but is expected to continue at least until 2027.

Key words: global inequality, income distribution, World Income Inequality Database

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1 Introduction

The analysis of the global income distribution is the study of inequalities among all citizens in the world regardless of where they live. Since it started in the early 2000s, it has increasingly become a key topic of research with particular repercussions in the public and policy debates. The growing interest in assessing how income distribution changes over time among the world's population, and how this is shaped by global megatrends like globalization or technological change, which can be mitigated or exacerbated by countries' policies, is not exempt from contentious discussions fuelled by a lack of appropriate data and different approaches taken or periods analysed. The lack of data and a unified approach makes measuring global inequality quite complex but does not stop some stylized facts emerging from the existing literature.

Taking a long-term perspective, combining historical series with survey data for most recent decades, inequality followed an upward trend until 1980, which was followed first by stagnation between 1980 and 1990, and a decline afterwards (Bourguignon and Morrisson 2002, and Bourguignon 2015, 2019). Anand and Segal (2008) reviewed the earliest estimates of global inequality based on household surveys, pointing to an increase in inequality prior to 1970 or 1980, along with declines between 1990 and 2000, but with mixed evidence on what happened between 1980 and 1990 or 1995. The most recent decline in global inequality is also consistent with other findings, such as the analysis by Lakner and Milanovic (2016) for 1988–2008, extended by Milanovic (2022) for 2008-13, as well as by Niño-Zarazúa et al. (2017) for 1970-2010, or Davies and Shorrocks (2021) for 2010-15, among others.

Most of the previous analyses to describe inequality in recent decades were conducted using the Gini index as the main measure and using survey data, although there has been increasing use of other indices and approaches with different distributive implications that can alter the conclusions about the trend in certain periods. This can be clearly seen in the stream of literature which, after combining survey data with tax records and national accounts, moved the focus of inequality analysis to the evolution of the concentration of income at the very top of the distribution (e.g. World Inequality Lab 2018, 2022a, Chancel and Piketty 2021, and related research). This literature more clearly emphasized evidence showing a large increase of inequality, especially the concentration of income held by the world's richest people. Even stronger implications can be found when the approach shifts from a relative to an absolute view of inequality (as, for example, in Ravallion 2004, 2018, 2021 and Niño-Zarazúa et al. 2017), since the income differentials among people measured in PPP USD (absolute) have generally increased over time even when growth rates were stronger among the poor (relative).

This paper aims to contribute to this growing literature in different ways. First, I introduce a new integrated dataset with annual information of percentile income distributions by country and globally from 1950 to 2020. This new dataset is a companion to the World Income Inequality Database (WIID), the successor of Deininger and Squire's (1996) initial compilation.[1] The database is publicly available and uses rich within-country distributive information based on household surveys from a variety of international and national sources, mainly based on survey data. The original income distributions, which are heterogeneous across welfare concepts and other methods, have been adjusted in a simple and transparent way to allow more consistent comparisons across countries and over time. To avoid sample composition effects, the dataset is a balanced panel of countries, in which missing country–year income distributions have been either interpolated or extrapolated. But there is a survey year falling within a bandwidth of five years from the target period for more than 50 per cent of the world population after 1950, reaching nearly 100 per cent in most of the 2000s (see appendix 4). The annual estimates are revised and updated as new or better information becomes available, at least once per year. Here, I also incorporate projections on future distributions (2021-27) using the most recent International Monetary fund (IMF) per capita income estimates, along United Nations Department of Economic and Social Affairs (UNDESA) population projections, and assuming constant inequality at the country level.

Second, the paper provides a general overview of trends in global inequality using a broad approach to fully describe the distributional changes at different points of the distribution and establish the robustness of the inequality results to different legitimate but sometimes conflicting, normative views on what inequality means. Rather than imposing any particular views on inequality, I assess the level of consensus among different approaches, regarding how economic growth affects inequality (relative versus absolute views of inequality), or various distributive sensitivities using inequality measures that put more emphasis on changes that occur at different parts of the global distribution (e.g. whether we give more relevance to low income growth at the bottom or to higher income concentration at the very top as the main source of inequality). I also analyse the sensitivity of the trends in global inequality to using alternative measures of country per capita income from different data sources, as well as from correcting survey-based estimates for the potential underestimation of incomes at the top of each country's distribution.

[1] The WIID and Deininger and Squire (1996) have been widely used in this literature, including earliest studies such as Chotikapanich et al. (1997), Dowrick and Akmal (2005), Sala-i-Martin (2006), and Schultz (1998) or, more recently, Davies and Shorrocks (2021), Jordá and Niño-Zarazúa (2019), Niño-Zarazúa et al. (2017), or Roope et al. (2018).

Third, the paper uses an innovative approach based on the Recentred Influence Function (RIF) (Gradín, 2020b) to quantify the contribution of the main countries and regions to changes in total inequality overt time. Following an extended Blinder-Oaxaca approach, these contributions are decomposed (ceteris paribus) into contributions to changes in inequality between countries, inequality within countries, and a composition effect (due to differential population growth). This decomposition is more robust and consistent than the usual practice of assessing the contribution of a country by evaluating the change in inequality after removing it from the sample. The approach used here guarantees that the sum of the contributions of all countries or group of countries add up to total change in inequality, and do not depend on the order in which countries are considered or how they are grouped.

The paper's results are highly consistent with previous evidence based on survey data, but they enable a more detailed, systematic, and comprehensive analysis of the patterns in the global distributive trends in terms of time and geographical coverage as well as the distributive approaches that can be used. These results are also reconciled with those based on alternative measures of per capita income across countries, or on correcting the underestimation of the income share of top incomes in survey data.

The results show that absolute inequality, which requires larger dollar increases among poorer people over time for inequality to decline in a context of economic growth, has continuously increased since 1950, apart from short episodes around the main global economic recessions (in which dollar income losses tend to be larger for the rich). This increase has affected both between- and within-country components, which reinforce each other. Lorenz dominance is the norm in this approach, indicating that the trend is unanimous and not affected by different distributive sensitivities about the magnitude of conflicting income changes at different parts of the distribution.

A more complex and different storyline emerges, however, in terms of relative inequality, which only requires higher growth rates (not dollar amounts) among lower incomes for inequality to decline. This is reflected in the lack of total unanimity in the direction of inequality since strict Lorenz dominance occurs only in the long term, pointing to an overall decline, but is rare when comparing ten-year periods. There are three differentiated periods, with more agreement on the trend before 1980 and after 2000, and much less in between.

The results show that after several decades of increasing or stagnant inequality, there was a period between the end of the 1970s and end of 1990s of mixed evidence because two forces operated in opposite directions. There was increasing concentration of income at both the bottom 40 per cent (with an equalizing effect) and the top 10 per cent (inequality enhancing), at the expense of the

middle, making the results depend on how much weight we give to each phenomenon in assessing the direction of inequality (which is reflected in crossing Lorenz curves).

Therefore, most indices or inequality views agree that global inequality has been sharply declining in recent years, but the initial year in which this started varies depending on the index used, and therefore on the different weights attached to changes affecting different parts of the distribution going in opposite directions. The decline starts earlier (in 1976) if we factor in the substantial improvement of the bottom 40 per cent of the population (e.g. mean log deviation, MLD, or the Palma index) or later (in 1998) if we give more relevance to the higher concentration of income at the top that occurred in the 1990s (e.g. GE(-2) and coefficient of variation). If we do not put too much focus at either end of the distribution, then the starting point lies somewhere in between (i.e. 1991 with the Gini index).

The main challenge to the story about relative inequality occurs when attaching extreme sensitivity to the very bottom of the distribution (e.g. GE(-1)). With all the necessary caveats when it comes to measuring the lower tail of the distribution, the results show that after sharply declining for several decades, inequality first stagnated and then increased after 2004, reflecting that part of the world has been disconnected from the latest development trends.

The decomposition results highlight that the main trends in global inequality can be largely explained by the economic evolution of China and, to a lesser extent, India. The initial decades are characterized by growing income differences between countries, with China and India being left behind. However, this is offset to a large extent by a declining trend in inequality in these two populous countries and in others. For example, China alone contributed to almost 80 per cent of the fall in the Gini index between countries and almost 95 per cent of the increase in inequality within countries before 1980. These trends later totally reversed, with within-country inequality starting to generally increase according to most relative measures, especially from the late 1980s and early 1990s (stalling more recently), while between-country inequalities started to decline somewhere between the mid-1970s and 2000, depending on the distributive sensitivities. Therefore, while there is large agreement among relative indices on the increase in within-country inequality after 2000 (exhibiting Lorenz dominance), there is much less agreement on the direction of changes in between-country inequality before 2000, which yields to different conclusions depending on distributive views.

The results also highlight the contribution to higher global inequality (from the upper tail) of former socialist Eastern European countries during the transition to a market economy between mid-1980s and late 1990s. But the main driving force during most recent decades is again China, that contributed to more than half of the fall in the Gini index between countries and almost the

entire increase within countries after 2000 (i.e., -6.5 and 1.7 Gini points respectively). The additional contribution of India, -1.9 and 0.5 in each case, was also remarkable. Similarly, the impact of faster population growth in the sub-Saharan African region on global inequality is also substantial, ceteris paribus (e.g. the decline in the global Gini index in this period would have been 3 points higher without this composition effect).

I also show how the main narrative on the trend in global inequality is affected by two key methodological choices affecting, respectively to inequality between and within countries. First, the decline in inequality would start later (e.g., around 2000 instead of 1991 with the Gini index) if per capita income growth in China was less impressive, that is, the country started from a higher income level relative to the global mean and witnessed a smaller growth rate afterwards as in the Penn World Tables (PWT) compared with the lower level in the World Development Indicators (WDI), the reference in our main analysis. Second, correcting the upper tail of our survey-based within-country distributions with the income share of the top 1 per cent estimated by the World Inequality Lab, which shows a higher concentration of income at the top, implies a non-negligible change in the scale of global inequality, which is substantially higher (e.g., between 2 and 4 Gini points), but not so much on the evolution of most popular indices. The main trend is maintained, although the magnitude of the fall in the last decades is smaller. Remarkably, the important decline in inequality after around 2000 is maintained in these two robustness analyses.

Finally, I address legitimate questions about the continuity in the decline in global inequality that its recent trend may raise. The decline in global inequality shows a clear deceleration as China approached the global mean income, whose influence on global inequality between countries consequently declined. That is, the main factor that brought inequality down in recent decades is no longer contributing to further declines and will eventually contribute to higher global inequality. The trend in global inequality will therefore depend to a large extent on the relative growth rates of sub-Saharan Africa and South Asia, compared to the richest regions, in the years to come. With all the necessary precautions when it comes to ascertain future trends, the use of most recent IMF income projections suggests that after a small but qualitatively remarkable increase in 2021 in the context of the COVID-19 recession, inequality between countries may continue declining at least in the following years (2021-27), as the recovery of India, whose growth trend was severely hit by the pandemic, is expected to be strong again. This would contribute to keep reducing global inequality in a scenario of stability in the distribution within countries (which has been dominating in recent years). Obviously, global inequality would rather increase if poor countries do not meet these expectations or within-country inequality substantially raises in the context of the pandemic and food and energy crisis (for which little information is still available).

The structure of the paper is as follows. The next section presents the new dataset, then Section 3 presents changes in per capita income by country. Section 4 discusses changes in the entire distribution and in inequality measures in the conventional relative approach, while Section 5 does the same from an absolute perspective. Section 6 focuses on the between- and within-country components of inequality, and Section 7 discusses the contribution of specific areas and countries. Sections 8 and 9 discuss the robustness to, respectively, changes in how country mean and top incomes are measured. Section 10 concludes.

2 Data

The analysis of global inequality faces considerable data constraints due to the lack of enough information collected consistently over time and across countries. To address this, I have put together a new global inequality dataset which is based on a classical database for cross-country analysis of inequality—the WIID held by the United Nations University World Institute for Development Economics Research (UNU-WIDER). All the datasets and Stata codes used are publicly available on the dataset website (UNU-WIDER 2022a, 2022b). The WIID was first launched in 2000, giving continuity to one of the first most successful initiatives, by Deininger and Squire (1996), for collecting cross-country information on inequality. The WIID has been updated several times, including an update by Deininger and Squire in 2004, and has been expanded to incorporate other sources. The most recent version is from 30 June 2022. The WIID, which has over 20,000 data points, collects and stores information on income inequality for almost all countries in the world (197 countries or territories and four historical entities) over the longest possible period of time for which reliable data are available (see Jenkins 2015 for an earlier assessment of the WIID).

The information is now mainly obtained from a variety of public sources, including international databases such as the Poverty and Inequality Platform (PIP, World Bank's Development Research Group), microdata from the Luxembourg Income Study (LIS) and Eurostat, the Socio-Economic Database for Latin America and the Caribbean (SEDLAC), the Organisation for Economic Co-operation and Development (OECD), United Nations agencies such as the UN International Children's Emergency Fund (UNICEF) and the UN Economic Commission for Latin America (ECLAC), several national statistical authorities, and about 200 research studies. Many of the historical sources in the WIID come from the original compilations by different authors and institutions in the 1970s and 1980s (e.g., O. Altimir, J. Cromwell, J.M. Jr. Dowling and D. Soo, G. Fields, S. Jain, F. Paukert, W. van Ginneken, see UNU-WIDER, 2022b). The dataset is a unique combination of data from the most prominent current data providers and historical or independent

sources, and it brings together this fragmented information in a systematic and organized way. However, we need to address some issues before using the WIID for the analysis of global inequality.

First, it is necessary to select the observations that will be used, because in many cases there may be more than one per country and year (for example, from different sources or referring to different measures of resources). Second, we need to deal with the heterogeneity in the welfare concepts measured, coverage, and sources. Although the most common welfare concept refers to some sort of income definition expressed in per capita terms, a substantial number of observations in Africa and Asia refer to per capita consumption instead, some observations may refer to income per household or per equivalent adult. Similarly, income can be gross or net (after taxes and social contributions have been deducted). Most observations refer to the national level and a few refer to urban areas or exclude specifics parts of a country. Furthermore, the values reported by different sources can diverge in other methodological aspects, such as survey or treatment of non-responses, etc. Third, only observations reporting income shares will be used, ideally, they report the full set of deciles and bottom and top 5 per cent, in some cases only the deciles, in others only quintiles. Finally, the information needs to be aggregated across countries to estimate global inequality, missing country years observations need to be imputed if we want to avoid ending up with a highly unbalanced panel with many missing observations for several countries and years. Omitting some countries implies assuming that the omitted population has the same distribution as the one covered, which is implausible, especially if the country composition changes over time, and this could affect global estimates. In this process we need an estimate of the mean income in each country and year (regardless of whether it is a survey year or not).

The entire process is discussed in more detail in in a series of technical notes (Gradín 2021a, 2021b, 2021c) which include several country examples (Anand and Segal 2008, Atkinson and Brandolini 2001, or Ferreira et al. 2015 discussed the main issues related to cross-country inequality databases). On summary, I first select the income distributions that best represent the long-term trend in each country (giving priority to the closest welfare concept to per capita national disposable income, and to more comparable international sources like LIS, ECLAC, Eurostat, etc.). Then, aggregate income distributions are disaggregated at the percentile level using a well-known ungrouping procedure (Shorrocks and Wan 2009). The resulting distributions are heterogenous. Although 70 per cent of the selected observations refer to income, the other 30 per cent refer to consumption, which typically is less concentrated than income. Not correcting for this necessarily implies a distortion. Also, most income observations are net, but there are about 13 per cent of income observations that are in gross (pre-tax) terms, and while most distributions are in per capita terms,

about 16 per cent are either per equivalent adult or per household. To avoid the distortions of comparing distribution of different welfare concepts, country distributions are standardized to reflect the distribution of net income per capita, with the level indicated by the main source taken as the reference in each country. This is done based on the empirical relationship observed among the distribution of different welfare concepts or sources, whenever possible, by chaining various series for the same country over time. Otherwise, it is done using a regression approach that exploits information for the same or similar countries (considering geographical region and country income group). That is, the regression relates income shares by percentiles in per capita disposable income and income shares using other welfare concepts in the LIS sample. This flexible procedure allows for adjustment factors to be different by world region, by country income group, or by country, depending on the case. This flexibility is important, as the necessary adjustment from per capita consumption to per capita income in sub-Saharan Africa or India, for example, seems to be much larger than in other developing regions. For example, based on LIS data in the WIID, the Gini index is about 34 per cent higher for net income than for consumption on average in India, or 30 per cent in Côte d'Ivoire, but only 9 per cent in Egypt, or 7 per cent in Vietnam. The regression-based procedure also allows the adjustment to vary with for each percentile value. Note that a big part of the previous literature has not addressed this important issue and has indistinctly used income for some countries and consumption for others.[2]

Also, for robustness, I evaluate the impact on global inequality of correcting for the underestimation of the income share of the top 1 per cent in each country. For that, I create a hybrid dataset that replaces the income share of the top 1 per cent of the population in each country, by the corresponding income share obtained from the public version of World Income Distribution (WID.world) produced by the World Inequality Lab, at Paris School of Economics, between 1980 and 2020.[3] The rest of the income shares in the WIID are adjusted proportionally so the total still adds up to 100. Countries with no estimates in WID.world, are retained to guarantee the same coverage as in the WIID. This exercise only adjusts the within-country distributions, average incomes are still those in the WIID, which as it will be later discuss, allows to isolate the effect of only correcting top income from other possible differences among these databases.

[2] There are some exceptions, like Niño-Zarazúa et al. (2017), who used a common adjustment factor at the decile level for all consumption-based distributions.

[3] The income distributions in WID.world are based on gross income per adult, instead of net per capita household income. I made no adjustment to account for that difference.

Population estimates are obtained from World Population Prospects 2019 by the Population Division of the UN Department of Economic and Social Affairs (UNDESA 2019). Annual per capita income in each country between 1950 and 2020 is approximated using an integrated series based on the GDP as measured by the latest versions of World Bank's (2021) World Development Indicators (WDI), with complementary information from the Maddison Project Database (2020) and the Penn World Tables (Feenstra et al. 2015). The latter are used to either extend backwards the WDI series before 1990 (imputing growth rates) or imputing missing countries (based on the relative income with the US in the series used for imputation). To make projections of between-country inequality over the next years (2021-27), I extend forward the series of mean income using the latest IMF growth rates projections (World Economic Outlook database, WEO October 2022), along UNDESA population projections. Overall global inequality is then also estimated under the simplifying assumption of constant inequality at the country level.

For robustness, I also evaluate the use alternative measures of country mean incomes. First, changing the main reference (WDI GDP) to i) Gross National Income (GNI, 2017US$) in WDI since 1990; ii) GDP in the PWT (expenditure-side per capita real GDP at chained PPPs, 2017US$); and the Maddison project (GDP, in 2011US$, multiple benchmarks). In these cases, lacking information is still imputed from the other sources. Finally, I also evaluate the use of gross income per adult as estimated in WID.world (2017US$).

3 The global income distribution, a relative approach

3.1 Distributive income growth patterns

The global distribution of income among all citizens in the world has exhibited important changes over the last decades. The non-parametric density functions, displayed in Figure 1 for selected years, highlight the huge shift of population mass from the very bottom of the (log-)income scale to higher levels. This process is the translation of the growth described in appendix 2 at the individual level once we account for existing high and changing within-country inequality. The skewness of the global income distribution has clearly been reduced. These densities show an outstanding bimodality visible in the log-income scale which is accentuated in the first decades but starts to fade from 1990 onwards, and completely vanishes after 2000. Indeed, the level of global income bipolarization using the index proposed by Esteban et al. (2007) (with $\beta=1$ and $\alpha=1.6$) first increased and then sharply declined (0.226 in 1950, 0.272 in 1990, 0.182 in 2020), in line with previous results on bipolarization in Roope et al. (2018) for 1975-2010. This depolarization process is a good indication of the structural changes that completely modified the shape of the distribution during those years.

To better visualizing the changes in the individual relative income distribution over time, Figure 1 also shows the accumulated change of quantile curves over time (relative growth incidence curve, GIC), and the share of total income held by three well representative world population groups.

The relative GICs map accumulated percentage income growth rates by income percentile. The income growth rates before 1980 follow a U-shaped pattern (i.e., polarization in growth), with the strongest growth rates at the bottom and upper-middle levels of the income scale with growth being weaker at the middle and very top. This income growth pattern substantially changed in the 1980s and 1990s with the collapse of communist regimes in Eastern Europe, the deceleration of growth in Japan and other advanced economies, and the start of a trend of rising inequality in a large number of countries, with a decline in real incomes of people between the 63rd and 83rd percentiles in the 1980s or between the 77th and 81st in the 1990s. This particular pattern of stagnation in the upper-middle part of the distribution and at the very bottom, combined with larger growth rates almost elsewhere (upper bottom, middle and top), is behind what has become known as the 'elephant' curve (Lakner and Milanovic 2016). This elephant pattern faded afterwards, leading to a clearer inverted U-shaped pattern in the 2000s where growth at the middle of the distribution becomes stronger, reflecting the success of emerging economies like China, despite the evidence of growing inequality within countries, including in China, continuing to a large extent.

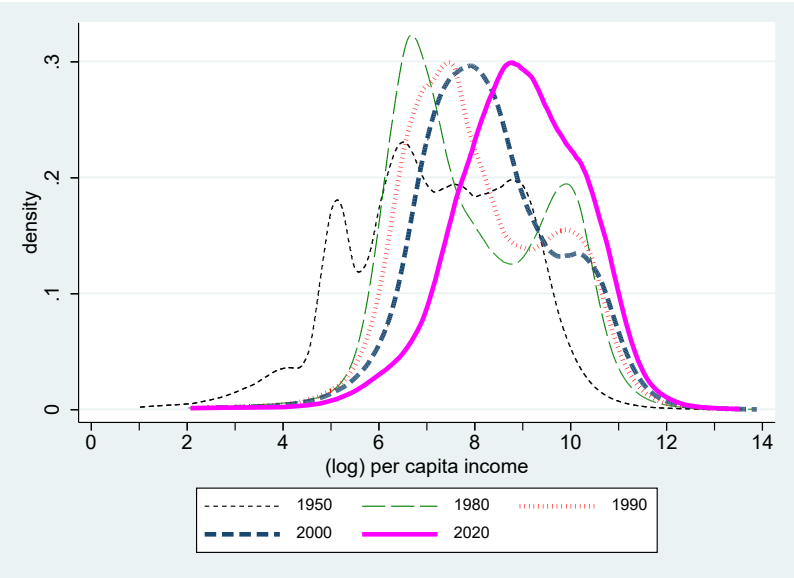
As the result of the previous growth pattern, the share of the global top 10 per cent tends to remain around 50 per cent of total income until 1984, when it starts to rise sharply, reaching its maximum of 55 per cent of global income in 1994. Then, it declines to its current level of 44 per cent. At the same time, the income share of the bottom 40 per cent initially declines from 3.4 per cent at the end of the 1950s to its minimum of 2.8 per cent in 1976, and then sharply increases to its current level of 6.4 per cent. That is, both income shares were initially relatively stable and then increased in the 1980s and 1990s. These gains at the extremes obviously come at the expense of the share of the middle of the distribution. Since around 2000, however, there is a change in the trend of the top 10 per cent that starts declining, while the bottom 40 per cent share continues growing (now along the middle 50 per cent share). It is important to note, however, that the trend in the income share of the bottom 40 per cent is not matched by the trend of the very bottom of the global distribution, due to the relatively better performance of the bottom 5 per cent during the initial decades and its stagnation in the last 30 years, that deteriorated after the financial crisis, while the largest increase is concentrated between percentiles 21 and 40 (Figure A2).

Figure 1 also shows that the most recent trends are expected to continue over the 2021-27 period, based on IMF per capita growth projections by country, and under the scenario of no substantial

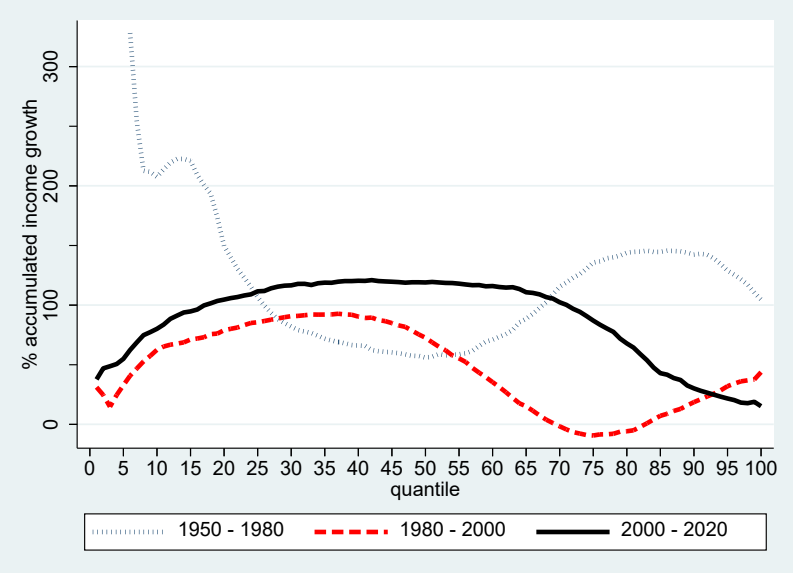
change in within-country distributions (which is the trend observed in most recent years as will be later discussed).

Figure 1: The global income distribution and relative changes, selected years

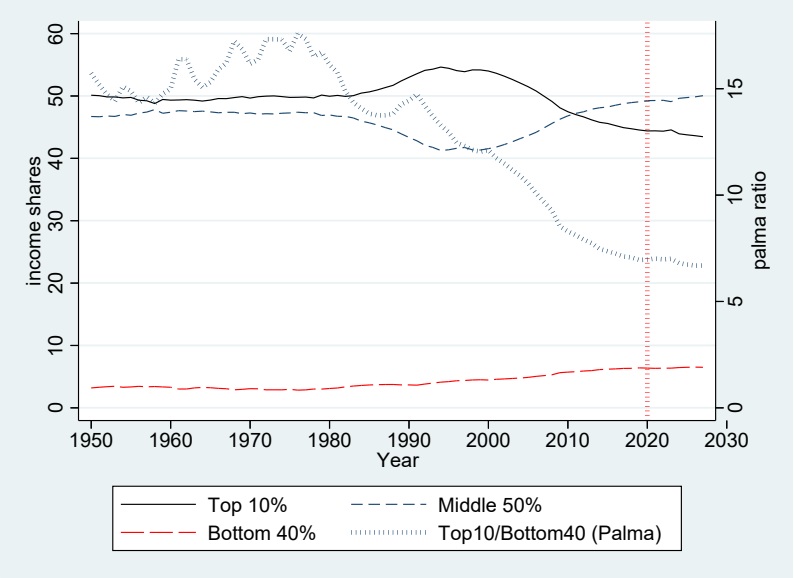
a. Densities



b. Relative growth incidence curves



c. Income shares and Palma ratio



Source: author's construction (see data section).

3.2 Changes in global relative inequality

What are the implications for inequality of the previously discussed distributional growth patterns? This will depend to a large extent on how much emphasis we want to put on growth at different parts of the distribution. The most common framework for assessing inequality is based on the Pigou-Dalton Principle of Transfers. This means that a distribution exhibits less inequality than another one if the former can be obtained from the latter after a sequence of progressive transfers. This principle needs to be combined with a value judgement that allows to compare distributions with different mean incomes, which can be controversial. The conventional approach to deal with changing mean incomes over time is to assume that inequality is invariant to changes in the scale of incomes (scale invariance), which allows us to focus our attention on the evolution of income shares rather than dollar amounts. I follow this relative approach here, later I discuss the implication of using an absolute approach instead. Basically, in the relative context, pro-poor growth rates by percentile (a downward sloping GIC) lead to lower relative inequality, while pro-rich growth rates (upward sloping GIC) to higher inequality instead. Based on the previous discussions, there are, at least, two main cases in which the GIC were non-monotonic and therefore the direction of inequality will depend on the net effect of opposite forces, which have to be assessed with explicit distributive sensitivities (how much relevance we give to growth rates at different parts of the distribution).

One first case implying lack of unanimity is the 'elephant' GIC in the 1980s and 1990s. The trends in the income shares of the bottom 40 per cent and the top 10 per cent increasing at the same time, have obvious opposite effects on inequality: there is a trade-off between the disequalizing

higher share of the global rich and the equalizing higher share of the global poor. Whether one gives more weight to one or the other effect is a value judgement that may not generate consensus among people with different distributive sensitivities, who may legitimately conclude that inequality increased or declined. Inequality views that are more sensitive to the concentration of income at the top (for example concerned with the concentration of power that this implies), will point at a sharp increase in inequality. Inequality views that are more sensitive to changes in the bottom 40 per cent (and the resulting empowerment of the poor), on the contrary, will point at reducing inequality instead. This trade-off will imply that indices having different sensitivities will show conflicting trends too. Another case in which the lack of unanimity in assessing the inequality trend is evident, is the misalignment of the trend of the very bottom of the distribution (e.g., 5 poorest per cent) which has followed a very different pattern than the rest of the poor most of the time. This means that if we put more emphasis on the relative performance of this group, as opposed for example to the overall bottom 40 per cent, will yield very different conclusions (with inequality first declining and then increasing).

The most straightforward way of rigorously establishing how far we can go assessing the direction of the change in inequality regardless of people's distributive sensitivities is by using the Lorenz curves. It is well established (Atkinson, 1970), that non-crossing curves for two distributions imply that inequality is higher in the distribution with the curve closer to the (equality) diagonal based the principle of transfers, along anonymity, replication invariance and scale invariance, not needing to make explicit if we give more relevance to transfers that affect different parts of the distribution. The two patterns described for the evolution of income shares, however, are good examples of crossing Lorenz curves, with the implication that we cannot assess the direction of inequality unless we make explicit our distributive sensitivity to different parts of the distribution, as it is implicitly or explicitly done when using particular inequality indices.

3.3 Global relative Lorenz curves

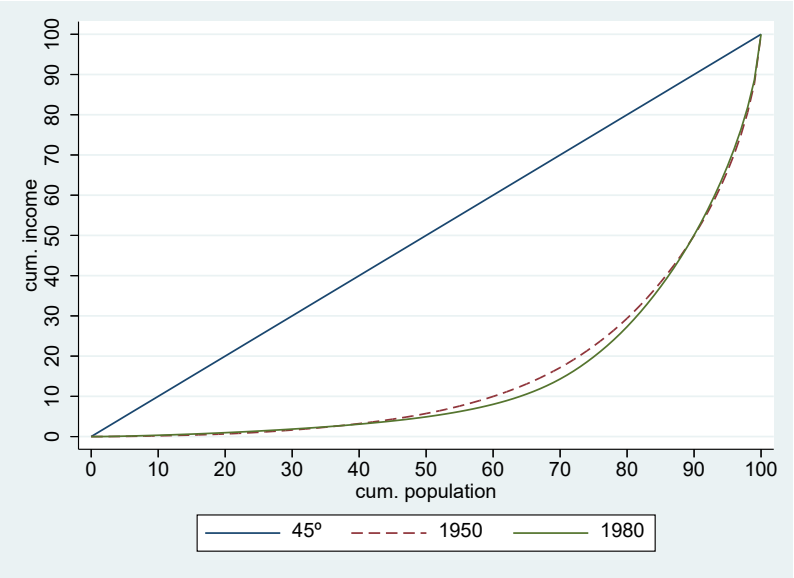
The analysis of the relative Lorenz curves (Figure 2, summarized in Table A1) confirms the general lack of unanimity in assessing global trends in inequality. I find clear evidence of an unambiguous decline in inequality (Lorenz dominance) only in the long term, i.e., between 1950 and 2010 or 2020 (the former curve falling entirely below the latter). However, there is more ambiguity in comparing shorter periods. This lack of dominance when each decade is compared with the next decades may imply multiple crossings, as reflected in Table 1, and is the result of growth patterns involving a combination of equalizing and disequalizing changes being observed at the same time. In some cases, one could say that the trend can still be assessed with a large degree of consensus among most relative inequality views (indices with their underlying normative criteria), since

crossings only occur at the extremes of the distribution (with curves almost overlapping beyond the crossing). For example, the first decades, between 1950 and 1980, seem to generally show increasing inequality looking at the central part, but there is no unanimity due to two crossings in the Lorenz curves (at 38th and 90th percentiles), even if the curves roughly overlap beyond those two points. This is also clear when comparing the last two decades, 2000–20, in which the Lorenz curves exhibit one only crossing at the very bottom (percentile 3). This pattern points to inequality declining since 2000 unless we give a large weight to the relatively worse performance of the very bottom of the distribution (if we ignore potential measurement issues of their income shares).

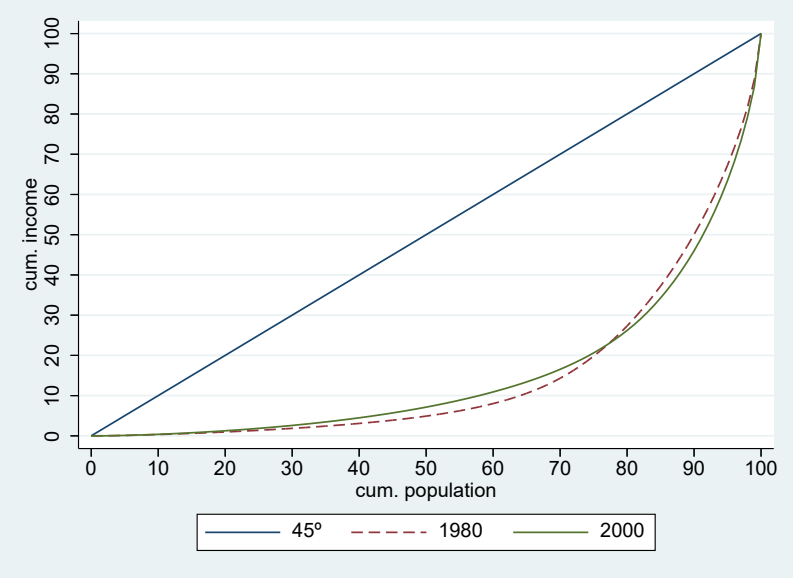
As expected, the lack of unanimity is stronger when assessing the inequality trend between 1980 and 2000, which involves two crossings at the very bottom (5th percentile) and at the upper middle (78th). This points to lower inequality if we emphasize the improvement in relative incomes for most of the poor and middle of the distribution. But it also points to higher inequality if, instead, we emphasize either the stagnation of the poorest 5 per cent, or the higher concentration of income at the upper tail (e.g., top 10 per cent) at the expense of the upper middle, the phenomenon behind the elephant curve in the GIC.

Figure 2: Global relative Lorenz curves, comparing different selected years

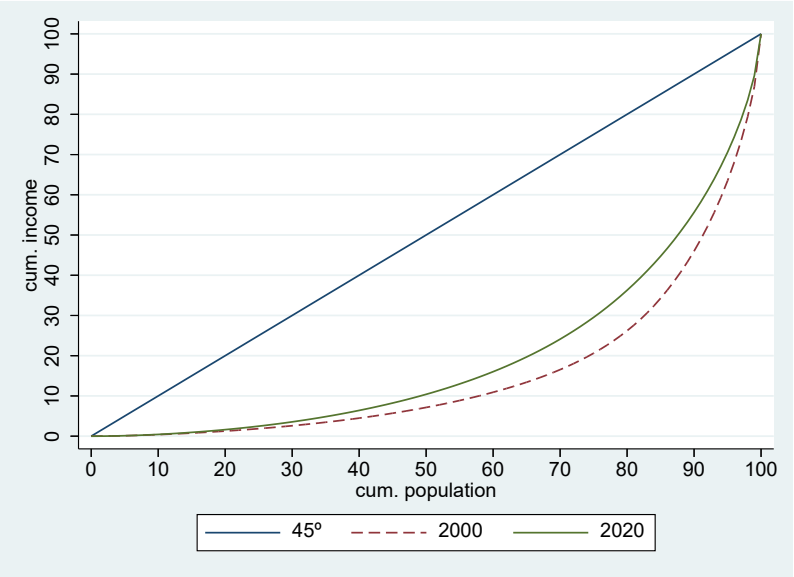
a. 1950-1980



b. 1980-2000



c. 2000-2020



Source: author's construction (see data section).

3.4 Aggregate measures of global relative inequality

Consistently with the above discussion, the main summary inequality measures like the Gini index, the MLD, the Theil index, or the GE(2) (Figure 3) agree in exhibiting an initial phase of certain stability (or a small increase) which is followed by a much sharper decline. The main discrepancy among them is about the turning point year and the magnitude of changes, especially because of the conflicting results for the 1980s and 1990s. All of them show a decline in inequality almost continuously since at least 1998, but earlier the more sensitive the index is to the bottom 40 per

cent and less to the top 10 per cent:[4] i.e. MLD (from 1976)[5], Gini index (from 1991), or Theil and GE(2) (from 1998). Also, all these indices exhibit a decline in inequality over the entire period from 1950 to the present, consistent with Lorenz dominance over this period.

There is no doubt that the trend also shows a deceleration over time from which one can infer a future reversal. The most recent projections on the evolution of population and per capita income by country, under the simplifying assumption of constant inequality within countries, point at a generalized but small increase in global inequality during one or two years as the result of the pandemic (between 2019/2020 and 2021/22, depending on the index), but the downward trend would resume at least until 2027 with these indices.

There is therefore a great level of consensus among distributive sensitivities (and indices) that global relative inequality has strongly declined at least in the last two decades, changing the previous trend, but much less consensus exists about the 1980s and 1990s. The main source of discrepancy about what happened with relative inequality since 1950, however, relies on putting a large weight at the very bottom, e.g. GE(-1), in which case the story is totally reversed with inequality first falling deeply and then exhibiting a small increase more recently (from 2004), due to the relatively better performance of the very bottom during the initial decades and its stagnation in the last 30 years.[6] The impact of the pandemic in this case, in the scenario of stable within-country inequality, would be of a decline in inequality between 2019 and 2020 (the poorest countries are not the most immediately impacted by the crisis), but this would be followed by a large increase between 2020 and 2023 and an sustained upward trend afterwards, pointing at the recovery again leaving behind the poorest population.

These results are consistent with the previous literature based on household surveys despite important methodological differences (Figure 3). Some of these studies do not use the same country composition over time (unbalanced panels) or have different population coverage, or do not adjust for the heterogeneity in the welfare concept (therefore using income in some countries, and consumption in others), or this adjustment is done using a different approach. The various studies also diverge in how they estimate country mean incomes, or in the use of exchange rates or various versions of PPPs for converting local currencies in dollars, especially affecting the level

[4] By definition, all inequality indices are sensitive to the extremes of the distribution, but to a different extent. The Gini index is less sensitive to both extremes, the MLD is particularly sensitive to the bottom, and Theil and especially the GE(2) are more sensitive to the top (e.g. Gradín 2020b based om their Recentred Influence Functions).

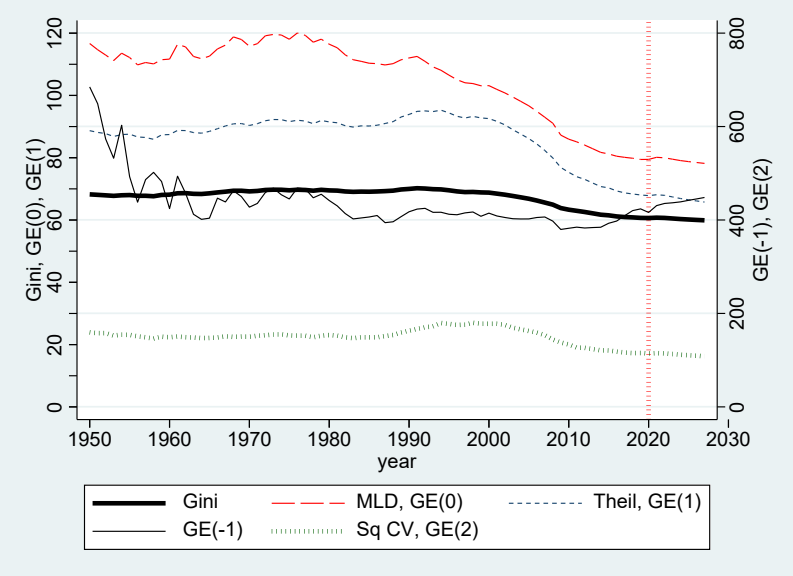
[5] The Palma ratio (Figure 1) between the income shares of the top 10 and bottom 40 per cent exhibits a similar trend.

[6] As a cautionary note, it is important to consider that this index is extremely sensitive to the incomes at the very bottom of the distribution and therefore any measurement error in their estimation.

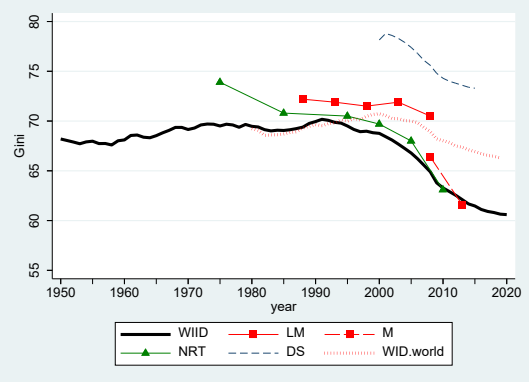
of inequality. The main deviation in terms of the trend, particularly before 2000, is observed with the WID.world database, which relies on a very different type of data and methods, something that is further analysed in the next sections.

Figure 3: Relative inequality measures: Gini and General Entropy family

a. Inequality measures



b. Global Gini index from this study (WIID) and others



Source: author's construction (see data section). Comparison (left graph) with WID.world, and reported data in Davis and Shorrocks (2021) [DS], Lakner and Milanovic (2016) [LM], Milanovic (2022) [M], and Niño-Zarazúa et al. (2017) [NRT].

4 Global inequality adopting an absolute approach

The absolute GICs in Figure 4 map the accumulated income changes in 2017 PPP USD (in thousands). This helps to put relative gains shown in Figure 1 in context, as growth rates have very different implications depending on the initial incomes, which tend to be very small at the bottom and very large at the top. Growth for the first six deciles is almost insignificant before 1980 when represented in dollar terms as initial incomes are very small and the growth patterns tend to increase absolute distances among individuals over time. Between 1980 and 1990, when growth is

negative in the upper middle, the graph reflects the 'serpent curves' described by Ravallion (2018), while the curve after 2000 reflects a much stronger growth of middle incomes.

The conventional relative approach used so far to assess the trend in inequality is the most common in the empirical literature but does not necessarily generate consensus among the general population.[7] From an absolute perspective, the ruling principle to identify what happens to inequality when total income changes is based on translation invariance rather than on scale invariance. That is, inequality remains constant if growth implies uniform dollar changes (not growth rates) across the population (a situation in which relative inequality declines). This is without any doubt, a more demanding criterion in the context of economic growth. The opposite is true in the case of economic recessions (uniform losses along the income distribution would keep absolute inequality constant but would increase relative inequality). Relative and absolute approaches are only equivalent in the context of income stagnation.

It turns out that changes observed in the global income distribution do not show any type of ambiguity or trade-offs in this case, unlike those observed in the relative approach. Dollar income changes have been generally pro-rich. Consistently with this, the absolute Lorenz curves (Figure 4, displaying the curves defined by Moyes 1987, as opposed to the relative ones proposed by Lorenz 1905) indicate an unambiguous increase of absolute inequality between the years being compared (the curves move away from the horizontal axis).[8] Therefore, the trend in absolute inequality does not depend on any distributive sensitivities and every inequality index which is consistent with these absolute Lorenz orderings will also point to an upward trend every decade and in the long term.

Indeed, inequality, as measured by the absolute Gini index (the Gini index multiplied by the global mean income) or the standard deviation, both absolute measures, continuously increase over most of the period analysed (Figure 4). The only exceptions are the short episodes of global recessions, such as in 1974–75, 1980–82, and particularly 2008–09 and 2019-20, with both indices used here, the standard deviation, and the absolute Gini index. The absolute Gini index also shows a decline during the 1990–93 recession. This upward trend is not surprising as the global distribution of income is characterized by strong sustained economic growth, a context in which it is unlikely that absolute distances between people are reduced, as reflected by the absolute GIC discussed above. This is true within countries (see Gradín and Oppel, 2021) but is even more the case when

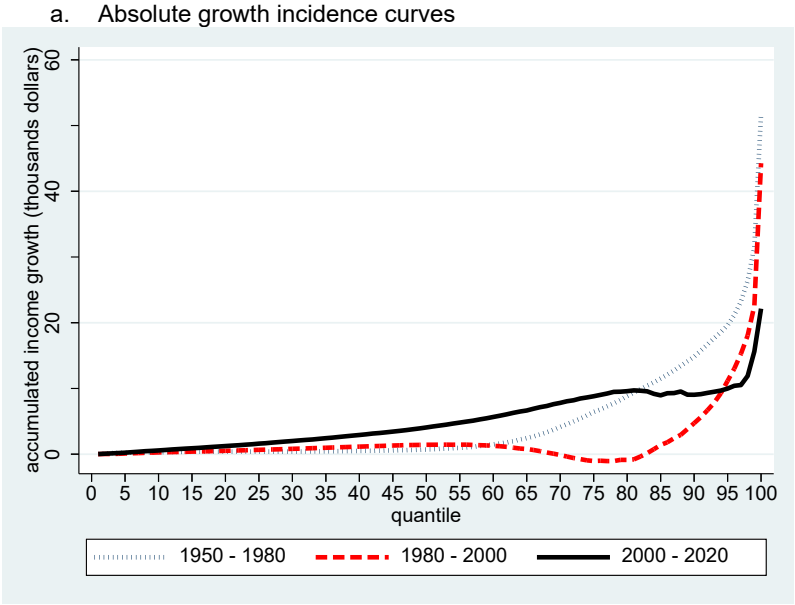
[7] Amiel and Cowell (1992) showed that 37 per cent of interviewed students supported relative inequality, 17 per cent absolute inequality, and 15 per cent showed intermediate views.

[8] The absolute curve accumulates percentile dollar income gaps with respect to the mean instead of income shares.

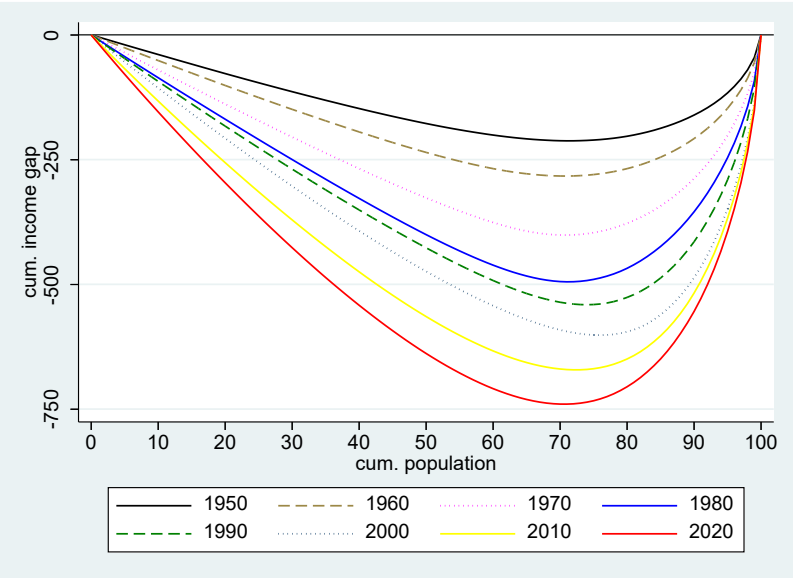
considering all the world's citizens given that initial income differences are striking. Figure 4 also shows the consistency of this trend for the absolute Gini index, with others that can be obtained from other sources.

Figure 4: Absolute inequality: Absolute growth incidence curves (in dollar changes), absolute Lorenz curves, and absolute inequality indices

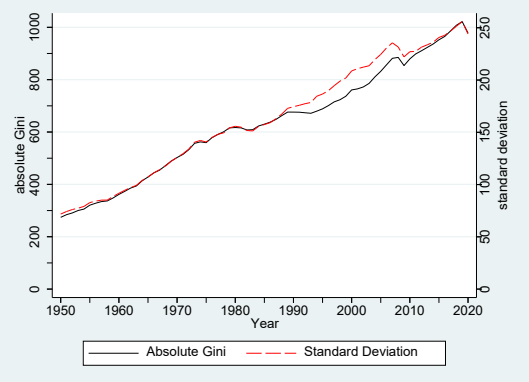
a. Absolute growth incidence curves



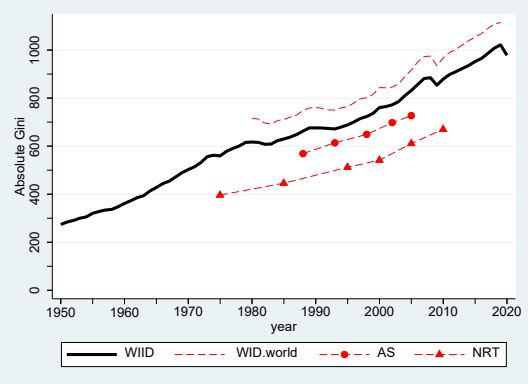
b. Absolute Lorenz curves



c. Absolute measures of inequality



d. Absolute Gini in this study (WIID) and others



Source: author's construction (see data section). Comparison (left graph) with WID.world, and reported data Anand and Segal (2015) [AS], and Niño-Zarazúa et al. (2017) [NRT].

5 Between-country versus within-country inequality

The previous literature has already shown that, unlike what is usually observed in many countries, the place where people live is the main determinant of the global income distribution. For this reason, I analyse changes in two counterfactual income distributions (see appendix 1a): i) one in which all inequality within countries has been removed after giving each country percentile the mean income of the country, and ii) another one in which all inequality between countries has been removed, after re-scaling all incomes by the ratio between global and country mean incomes (relative), or after adding the differential between the global and country means instead (absolute). The remaining inequality in each counterfactual are, respectively, pure 'between-country' and pure 'within-country' relative inequality. The within-country inequality term so computed is also the population-weighted average of country inequality in the case of the General Entropy family (MLD, Theil, GE(2)), and is very similar for the Gini index. To address the decomposition analysis in a meaningful way using any inequality measure (exhibiting different decomposability properties), in line with Davies and Shorrocks (2021), I also use the Shapley approach (Chantreuil and Trannoy 2013; Shorrocks 2013) to estimate the share of overall inequality that is explained by each term. This is the average of each term obtained in the two possible sequences that can be followed to

estimate them.[9] With this approach, the shares explained by between- and within-country inequality add up to 100 for all indices, facilitating comparability across indices.[10]

The use of the Lorenz curves of the between- and within-country distributions (Figure 5 and Table A2) allows to highlight some clear long-term patterns. On the one hand, the trend in within-country inequality is clear and does not depend on a specific sensitivity to different parts of the distribution. The 1950-80 period witnessed an unambiguous decline in inequality within countries, which was followed by an unambiguous increase between 1980 and 2000, exhibiting great stability ever since (i.e., the 2000 and 2020 curves entirely overlap). On the other hand, the between-country distribution shows a greater level of ambiguity before 2000. The multiple crossings in the Lorenz curves, especially between 1980-2000, are therefore the main reason for the lack of Lorenz dominance among the overall distributions during these periods, and then for the discrepancies among inequality measures discussed earlier, depending on the weight attached to each part of the distribution. The distribution between countries shows, however, an unambiguous decline between 2000 and 2020.[11]

The use of inequality indices (Figure 6) provides a quantification of the opposite trends followed by inequality within and between countries, as well as their relative importance. The between-country contribution tends to be larger than the within-country term with Gini, MLD, or Theil, but with the differential vanishing over time (reverting in 2020 in the latter case). Things differ

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[9] In the conventional approach (Shorrocks 1986), within-country inequality is removed first. The level of inequality that goes away is within-country inequality (that includes a residual term in the case of Gini index) even if in cases other than MLD it also depends on observed country mean incomes (i.e., it is not the level of inequality when all country means are the same). The level of inequality that remains is between-country inequality. Alternatively, one can first remove between-country inequality and define the remaining as within-country inequality, and the level that goes away as between-country inequality. Only in the case of MLD both paths lead to the same decomposition (the index is path independent). See a discussion in Chakravarty (2009).

[10] For example, overall Gini is 60.6 in 2020. With the two counterfactuals described above, Gini between countries is 47.1 (i.e., 13.5 Gini points reduction after removing inequality within countries), while the Gini within countries is 45.1 (i.e., 15.5 Gini points reduction after removing inequality between countries). Therefore, the Shapley decomposition indicates that between-country inequality explains 51.6 per cent of overall inequality ((47.1 + 15.5)/2=31.3 out of 60.6). One can be tempted to say that inequality between countries explains 78 per cent of overall inequality if we only look at the counterfactual in which all within-country differences were removed (i.e., 47.1 out of 60.6), in line with the conventional decomposition of the Gini index (Bhattacharya and Mahalanobis 1967; Pyatt 1976; Rao 1969). But this is misleading, because, similarly, one could reasonably say that inequality within countries also explains about 75 per cent of overall inequality based on counterfactual where any between-country differences were removed (i.e., 45.1 out of 60.6). The problem is that both terms add up to more than 100 which makes their interpretation more complex. That is why the Shapley decomposition points at a more balanced contribution by both terms, averaging between the terms obtained in the two paths (i.e., as inequality remaining, or as the inequality that goes away), which is closer to what is found with MLD (52 per cent), an index in which the contributions computed with both counterfactuals do add up to 100, making their interpretation easier.

[11] When compared together, the Lorenz curves of the distributions between and within countries cross at both extremes of the distribution every year. This means that one cannot unambiguously say that inequality between countries is generally higher, even if this is observed with most common indices until recently.

with indices more sensitive to either tail, since these tend to be more relevant at the country level (Figure A3). Inequality within countries is larger with GE(2) since 2009 and with GE(-1) since 2010. The Shapley share of overall inequality, which is explained by inequality between countries, exhibits a clear inverse U shape over time in all cases (Figure 6), with the maximum relevance of inequality between countries being achieved in the late 1970s and early 1980s in all cases.

Both components do tend to move in opposite directions with the between-country term driving the general trend in global inequality (first increasing, later decreasing) while the within-country term partially offsets that trend (first decreases, later increases). This dealignment of both terms is more balanced during the first phase, resulting in greater overall stability, but is less so in the second phase in which the decline in inequality between countries is much stronger than the increase in inequality within countries, explaining the overall decline.

As expected from the Lorenz analysis, the differences in how different relative measures evaluate global inequality are more related to the impact of changes in average incomes across countries than to changes within countries. These indices tend to agree more in pointing to an increase in inequality within countries from the mid-1980s, particularly before the mid-1990s. However, they disagree more in how they evaluate the trend in inequality between countries, especially related to when the decline starts (earlier with MLD, later with Theil index, in between with the Gini index). The index with extreme sensitivity to the bottom of the distribution, GE(-1), also exhibits a decline in between-country inequality from the mid-1970s but is less steep than other indices so the increase in within-country inequality dominates the trend during the most recent years.

Furthermore, all indices exhibit a deceleration in the decline of inequality between countries in the most recent years. The pandemic likely implied a reversal around 2020-21, but the projections point at inequality between countries to continue falling at least until 2027. This expected trend for the Gini index would be consistent with the least pessimistic projections in Kanbur et al. (2022) based on the 1990–2019 growth patterns. Note that in the projections discussed here, inequality within countries will tend to slightly increase after 2020 even under the assumption of constant distributions within countries, due to faster population growth expected in highly unequal countries. The impact of the pandemic and post pandemic crises may obviously imply a larger increase in this component that could totally or partially offset the decline in between-country inequality.

There is therefore no doubt that declining within-country inequality helped to partially compensate for the increase in between-country inequality before 1990, but the roles were totally reversed thereafter, with rising (or stable) within-country inequality only partially compensating for the strong decline in inequality between countries. Remarkably, the increasing within-country

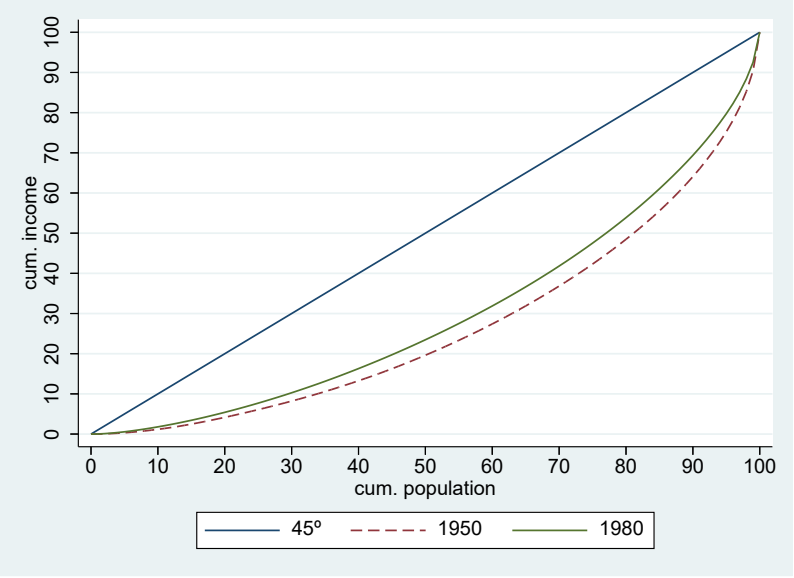
inequality during the last decades is the result of a heterogeneity of trends across regions and subperiods. The majority of the global population witnessed a robust increase in inequality in each decade, but the number of countries seeing declining relative inequality exceeds those with rising inequality in the 2000s and 2010s (Gradín 2020a; Gradín and Oppel 2021). Figure 6 also highlights the recent increases in population-weighted average inequality (Gini) predominant in East Asia and Pacific, South Asia, and North America, with declines in the Middle East and North Africa, sub-Saharan Africa (since 1992), Europe and Central Asia (since 1995), and Latin America and the Caribbean (since 1998).

In terms of absolute inequality, the story is once again much simpler. Inequality unambiguously increases over time pushed by both components (i.e., there is dominance with absolute Lorenz curves every decade both within and between countries). The Gini and Standard deviation indices displayed in confirm that both between- and within-country inequality components contributed to the sustained increase over time, a situation that will continue after 2020. Interestingly, since the 2000s, absolute inequality within countries seems to be more relevant to explain the upward trend.

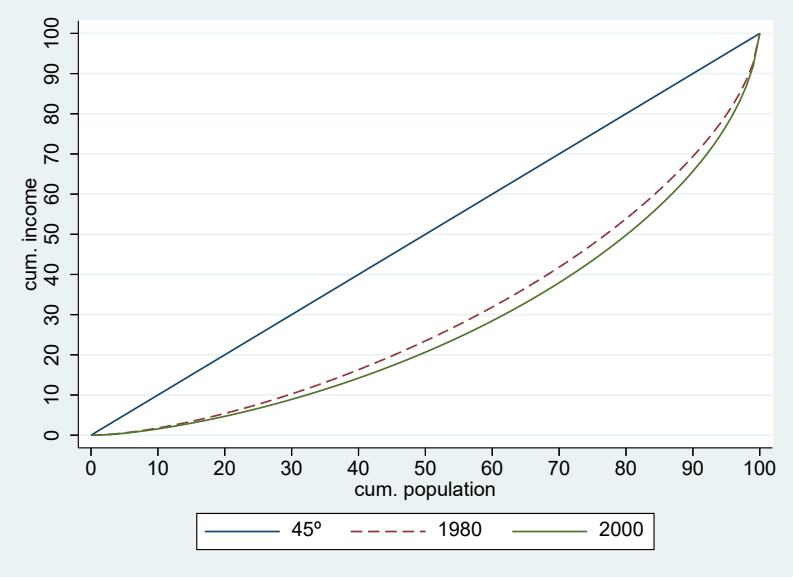
Figure 5: Lorenz curves

a) within-country distribution (inequality declined in 1950-80 and increased in 1980-2000)

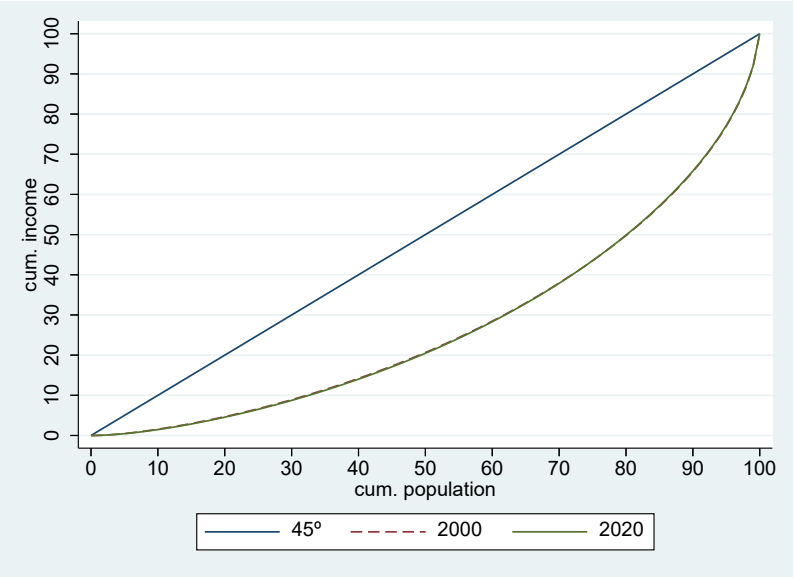
a.1 1950-1980



a.2 1980-2000

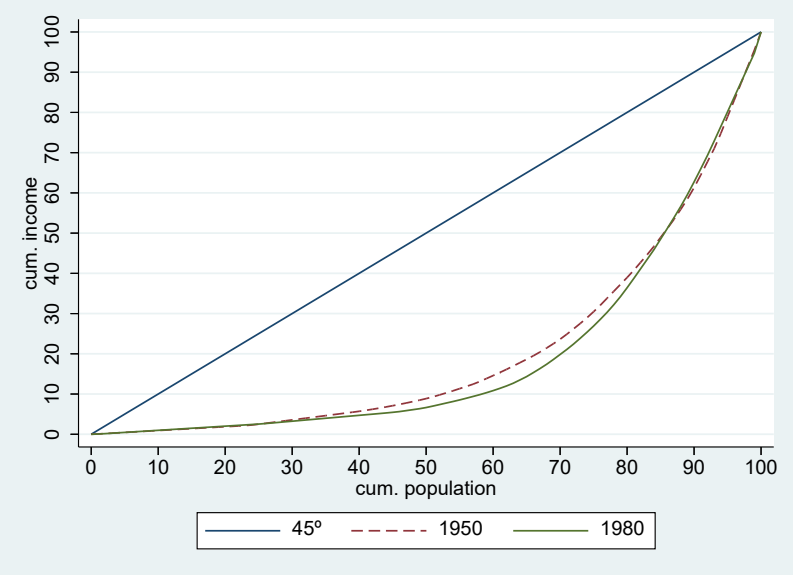


a.3 2000-2020

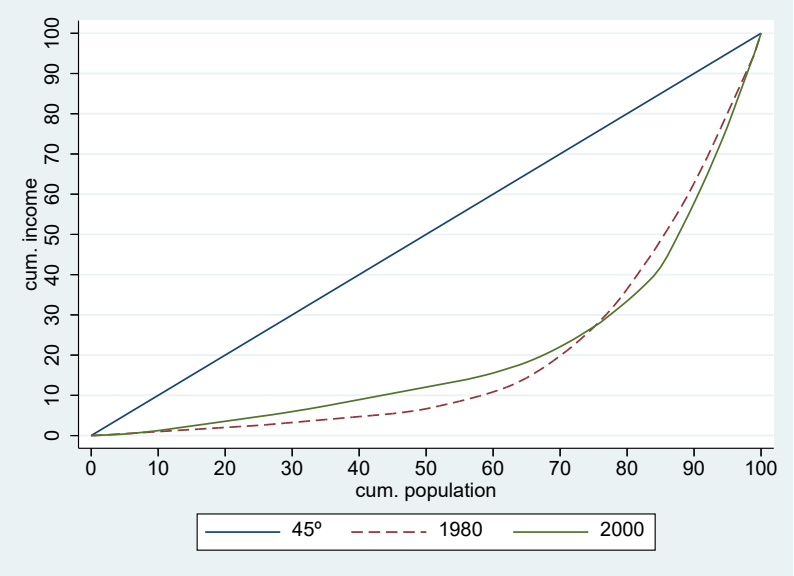


b) between-country distribution (multiple crossings in 1950-80 & 1980-2000; inequality declined 2000-20)

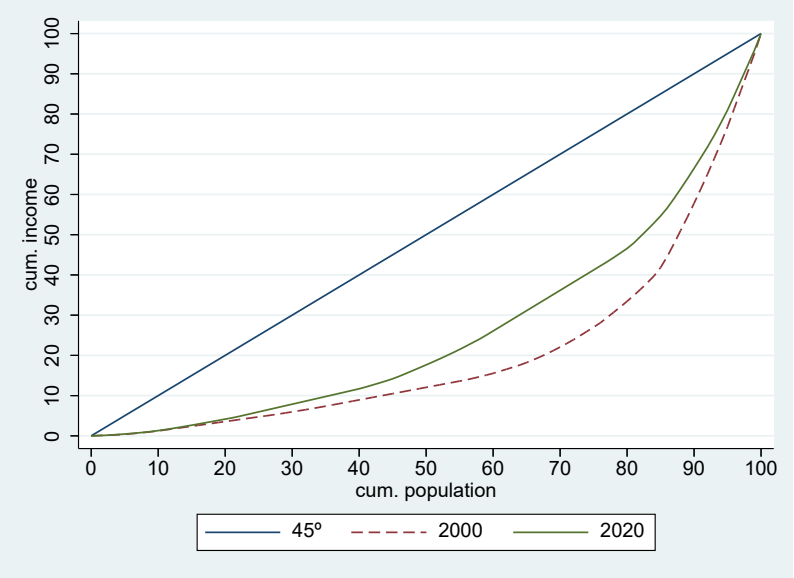
b.1 1950-1980



b.2 1980-2000



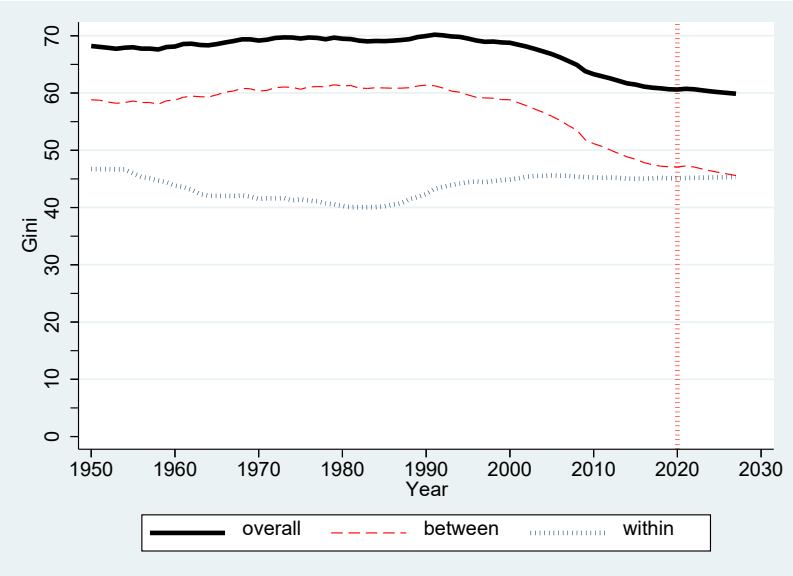
b.3 2000-2020



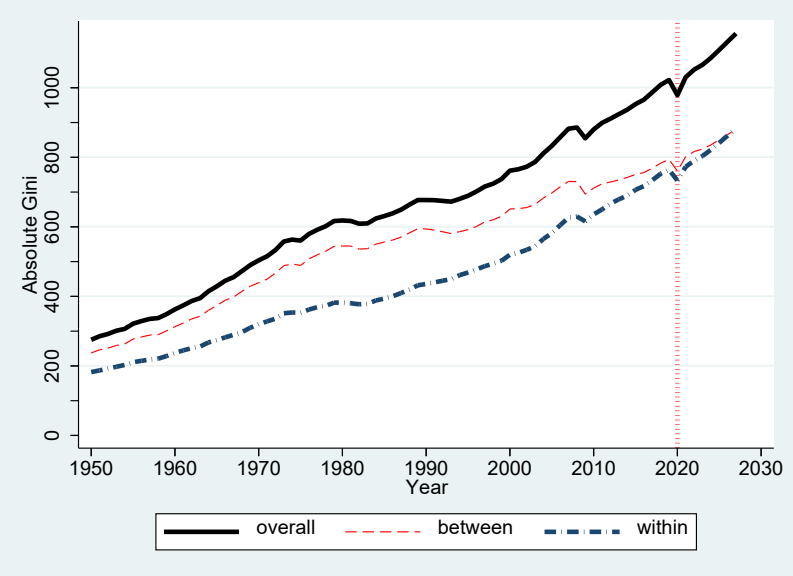
Source: author's construction (see data section).

Figure 6: Decomposition of overall global income inequality:

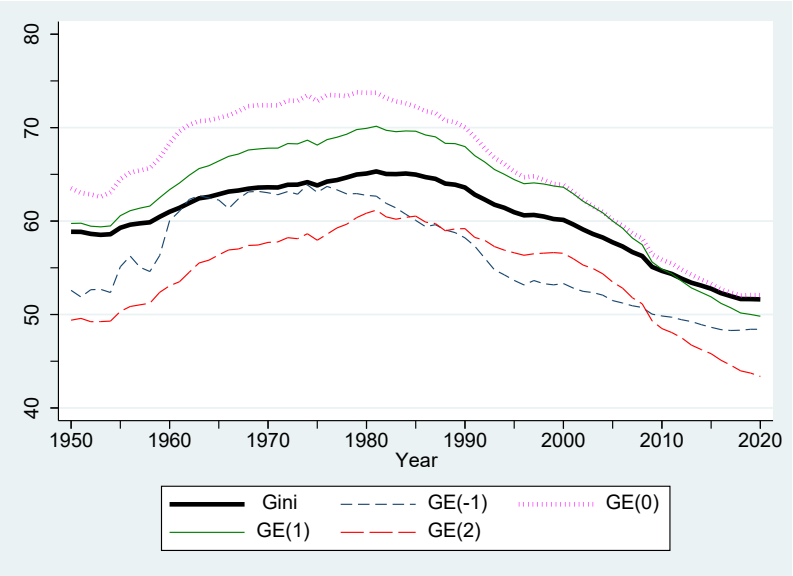
a. Relative Gini



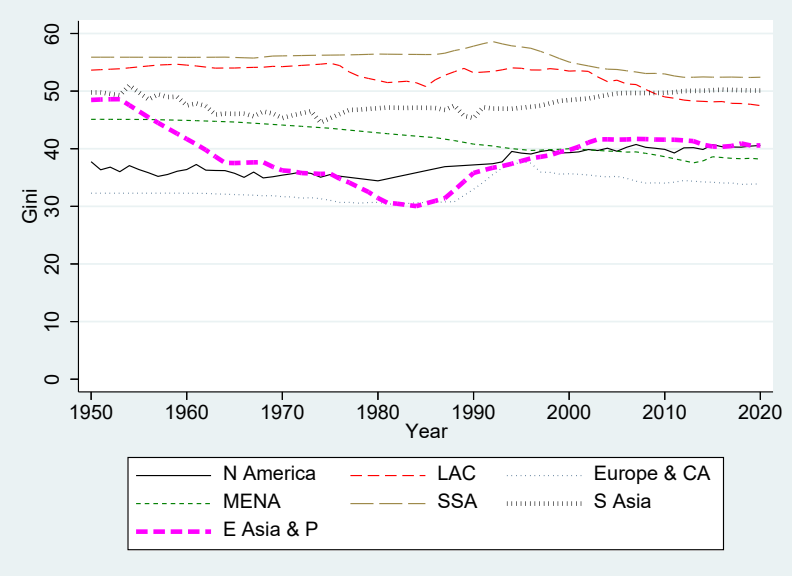
b. Absolute Gini



c. Shapley percentage contribution of inequality between countries (various indices)



d. Population-weighted average in inequality by region (Gini)



Source: author's construction (see data section).

6 Quantifying country contributions to the global inequality trends

A second aspect of the global inequality trend that has been highlighted so far is the existence of a big player, China, driving this trend. China's accounting for about 18 per cent of the total world population in 2020 (down from 22 per cent in 1950) and its GDP per capita having multiplied several times over this entire period determines a strong influence on the between-country inequality trend. China has also witnessed substantial changes in its income distribution (equalizing before the market reforms, mainly disequalizing afterwards) and this raises the question of the extent to which China alone is also driving the global within-country inequality trend, even if this did not get the same level of attention. A similar question can be asked of India, which has another 18 per cent of the current world population and has recently shown sustained economic growth and structural reforms with increasing levels of inequality, or of other countries or regions. Similarly, the collapse of communist regimes in Eastern Europe in the 1990s followed by falling mean income and rising inequality can also explain the trend in inequality, at least during that specific period and in the upper-middle part of the global distribution. Also, the world has witnessed important demographic trends that have increased the share of the world's population living in developing countries. For example, the doubling of the share of people living in sub-Sharan Africa (from 7 to 15 per cent), the geographical region which at the same time has become the poorest of all seven and exhibits the highest level of inequality.

The common approach used in the literature to address China's contribution is to measure the trend in inequality with and without China in the sample, interpreting the change in any inequality

index after adding China as its contribution to the trend in that index. This 'marginal' approach to measuring the contribution of the country to total inequality is quite intuitive, but can be misleading, though, and the values hard to interpret, especially if applied to various countries or regions. If repeated with every country, the sum of the contributions of all countries will not equal the total observed level of inequality (the decomposition is inconsistent). Similarly, the contribution of a region (e.g. East Asia and Pacific) would differ from the sum of the contributions of each country member. Furthermore, it is implicit that the target country is the last one to be added, but its contribution would be different if countries are introduced in a different order (the decomposition is path dependent). One can also envisage a situation in which all countries have the same income distribution (same per capita income by percentile). Adding any country at the end would not change the global distribution of income and so the contribution of each country would be zero, leaving all global inequality unexplained.

Instead, here, I follow the approach in Gradín (2020b), as explained in appendix 1b, which estimates the contribution of any population group (country or world region in this case) to inequality based on the sum of the contributions of people belonging to that group. These are estimated as the change in inequality after marginally increasing the population at each income level, given by the Recentred Influence Function (RIF) of the corresponding inequality measure. It is shown that, in the case of the MLD, this contribution is empirically equivalent to measuring the change in inequality after replacing the incomes of each group with the corresponding global mean using the Shapley approach (averaging across all possible sequencings of groups).[12]

This approach produces a path independent consistent decomposition and allows a more systematic analysis of the different contributions not only to overall inequality by any index but also to its within- and between-group components. We can identify in a consistent and systematic way which countries more strongly contribute to the trend in inequality in each period, with their contributions always adding up to the total they intend to explain. A country's contribution to inequality generally increases, for example, when the incomes in the country move away from the global mean (above, below, or in both directions). This contribution can be channelled through

[12] The marginal contribution of an income source to total inequality can be estimated as the change in inequality after either removing the income source ('zero income' decomposition) or equalizing the income source among all individuals in the population ('equalizing income' decomposition) (e.g. Sastre and Trannoy 2002). Removing a country from the sample is equivalent to the former, the approach followed here is equivalent to the latter. For example the contribution of a country to MLD in our approach is empirically equivalent (Gradín, 2020b) to the Shapley decomposition in which its contribution is measured as the change in inequality after giving all its citizens the world average income, i.e., the situation in which the country does not contribute to either inequality between or within countries (averaging the change computed over all possible sequences of countries).

the between-country or the within-country components. That is, on average, the entire country is moving away from the global mean (the country is getting richer or poorer) or is becoming internally more unequal, for instance.

Furthermore, it is worth noting that inequality changes over time can be driven by pure demographic trends due to some country populations growing faster than others even if relative per capita incomes remain constant (ceteris paribus, a country's contribution to global inequality and to its components will increase with its population size). Alternatively, a country's contribution to inequality can increase due to changes in the country's income distribution (with constant population); that is, the country becomes richer or poorer, or more or less unequal, keeping its population constant. To further disentangle these drivers, in each case using a Blinder–Oaxaca type of decomposition based on the RIF country contributions, I will identify whether these contributions to global overall, between-country, and within-country inequality are due to a demographic composition effect or a pure income distribution effect, and whether the distributional effect affects either the between- or the within-country income distributions -that is, the country that increases its contribution because the mean income moves to the extremes of the global distribution, or because it becomes internally more unequal. In this exercise I use the Shapley decompositions of overall inequality in its between and within components to guarantee that both terms add up to overall inequality with any index. This full decomposition exercise is equivalent to undergoing a RIF regression decomposition (in line with Firpo, Fortin and Lemieux, 2007, 2009).

Figure 7 displays the RIF contributions to the Gini index of a selection of countries over time, as well as by country region. Table 3 decomposes the change in those contributions between selected years into the distributive effects of inequality between and within countries (with constant population), and the compositional effect of changes in population (which can affect between- and within-country inequality), with constant mean incomes and distribution within countries. This highlights the extent to which the main trends in global inequality are shaped by the economic and demographic trajectories of the most populous countries or regions. The results depend only to some extent on which inequality measure is used. I focus here on the case of the Gini index (results for other indices as well in Tables A3-A5).

It becomes obvious that China's total (Shapley) contribution to inequality between countries dramatically increased from the mid-1950s and reached its maximum of almost 16 Gini points in 1977 (Figure 7). This is about 36 per cent of total between-country inequality or 23 per cent of overall inequality that year. China's contribution sharply declined thereafter to barely 2 Gini points in 2020 (nearly zero in the case of the MLD and Theil). The deceleration of the impact of China

on between-country inequality as it approached the global mean is thus evident too, meaning that the main force that has pushed global inequality down in recent decades is over.[13] At the same time, China's contribution to inequality within countries is also substantial and increased over the same period but to a much lesser extent (from 4.1 to 6.4 Gini points).

On the other hand, India reached its maximum contribution to between-country inequality in 1979 (9 Gini points), before reducing it to its current 5.8, which still gives room for future contributions to reduce global inequality as India catches up with the other countries.

As a result, China and India being left behind initially contributed to increasing global inequality between countries: for example, estimated with constant population (Blinder-Oaxaca decomposition) and in terms of the Gini index, 3 Gini points in the case of China and 1.5 in the case of India between 1950 and 1980 (the total increase for the world being 3.2, what indicates that the other countries altogether contributed to reduce inequality instead). China also contributed to a much larger extent than India to reducing inequality within countries as measured by the Gini index over the same period (-3.3 Gini points, versus only -0.4, out of a total of -4.2). The faster population growth in developing regions such as South Asia, sub-Saharan Africa, and East Asia, as compared with Europe, also explained another 2.3 Gini points of the increase in global inequality (total composition effect). As a result, the total contribution to the overall global Gini was close to zero in the case of China (i.e., -0.2, as opposed to a higher level of inequality attributed to India's contribution of 1.4 Gini points).

In the most recent period, out of 8.2 Gini points of the total decline in global inequality between 2000 and 2020, China accounted for 6 Gini points, driven by the fact that China accounted for more than a half of the reduction in inequality between countries (6.5 out of 11.5) with constant population. Another 1.2 Gini points of reduction were the result of a composition effect due to the slower population growth in China over this period. On the other hand, China's contribution to increasing within-country inequality was 1.7, out of a total increase of 1.8. In the same period, India contributed to a reduction of 1.2 in global Gini (1.9 in inequality between countries). The fall in inequality in the world excluding China would of 4.4 Gini points (8.2 when China is included). Based on this, one could estimate China's contribution to this fall being about 3.8 Gini points, or 0.1 in the case of India. These are below our estimates (6 and 1.2 Gini points

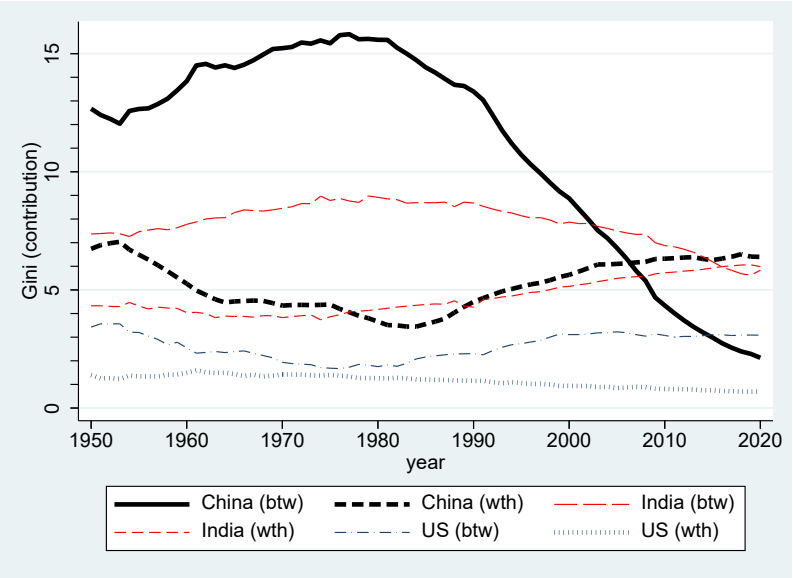
[13] Income per capita in China overpassed the global mean in 2020. When it goes above the mean, the immediate impact on inequality is going to be ambiguous as China growing faster makes the rest of the world (rich and poor countries) relatively poorer (i.e., crossing Lorenz curves). Therefore, depending on the sensitivity to each end of the distribution, the impact may still be reducing inequality (with more emphasis at the top) or increasing (with more emphasis at the bottom). If this path continues, further growth in China will eventually become disequalizing for all.

respectively).[14] However, if we do the same exercise with every country, the sum of all contributions add up to only 1.2 Gini points, meaning that most of the fall remains unexplained. With our approach, they add up to the total change over the period.

Despite the key roles of China and India, other things happened. For example, the sub-Saharan Africa's faster population growth prevented global inequality falling by 2.9 additional Gini points in the 2000-20 period. Furthermore, Figure 8 helps us to understand the impact of the collapse of former socialist regimes in Eastern Europe on the rise in global inequality between the late 1980s and late-1990s, particularly with indices that are sensitive to the upper end of the distribution such as GE(2). The Figure shows that former socialist countries together contributed to most of the increase in between-country inequality between 1988 and 1998 (9 points out of 11, Shapley decomposition). They also contributed to the increase in within-country inequality but to a lesser extent (4 out of a total of 15), indicating that the concentration of income at the top of the distribution in this period was not just explained by this process and was also driven by what happened in other countries.

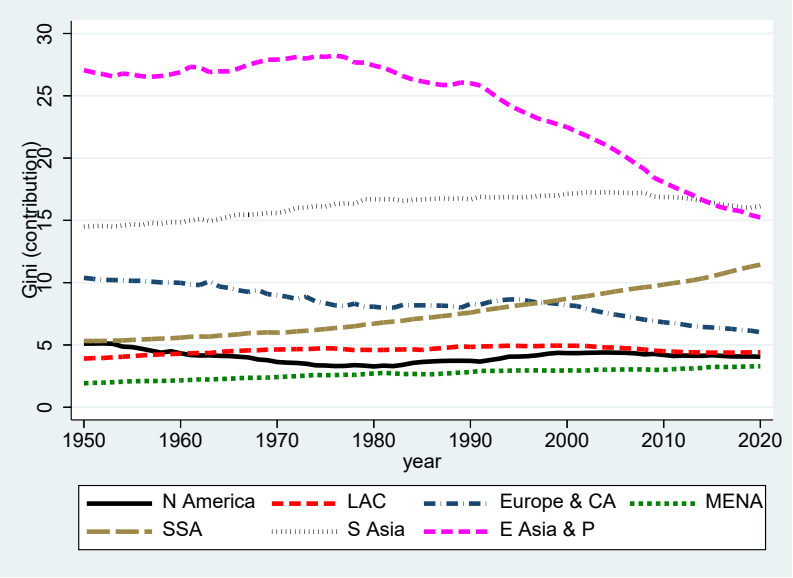
Figure 7: Country contributions to inequality, Gini

a. Selected countries: contribution to between-country inequality (*btw*) and within-country inequality (*wth*)

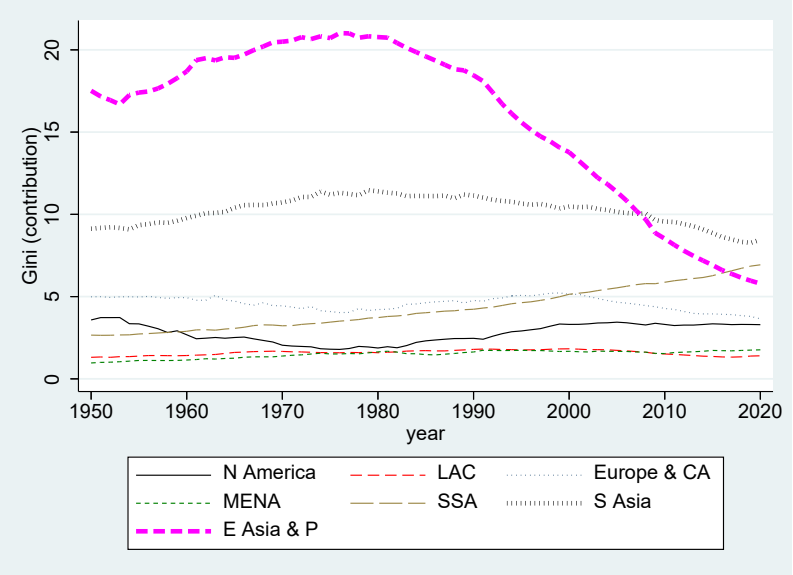


[14] That is, global inequality without China fell from 68.2 in 2000 to 63.7 in 2020 (67.1 to 59 in the case without India), while for the entire world the fall was from 68.8 to 60.6.

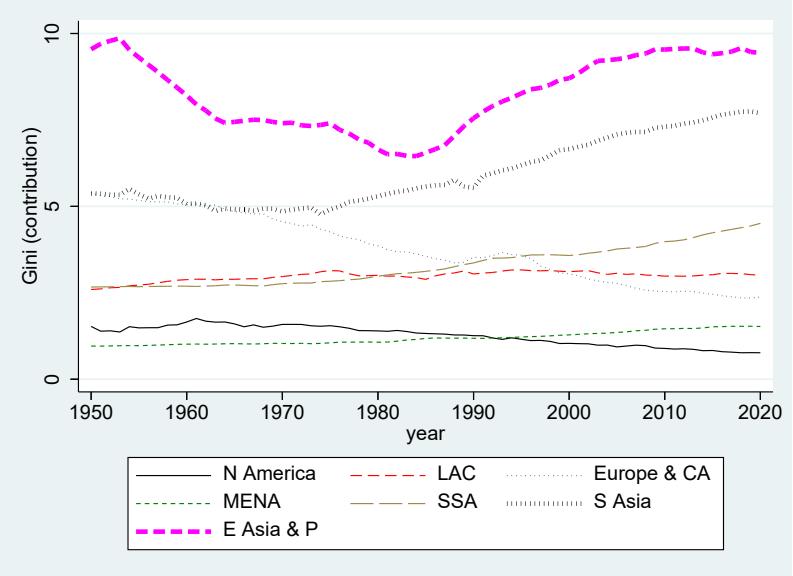
b. Regions: contribution to overall inequality



c. Regions: contribution to between-country inequality

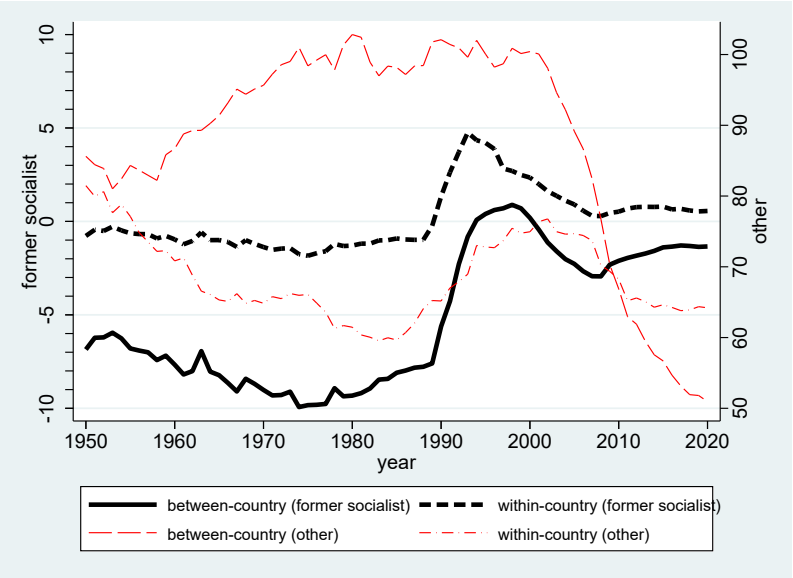


d. Regions: contribution to within-country inequality



Source: author's construction (see data section).

Figure 8. Country (Shapley) contributions to GE(2) inequality by former socialist countries in eastern Europe



Source: author's construction (see data section).

7 Sensitivity of global inequality to alternative measures of mean income by country

Given that the main trend in global inequality was driven by inequality between countries, which resulted from the extraordinary growth exhibited first by China and more recently by India, it is worth considering the extent to which other measures of average income would affect the results. This choice can only affect the between-country component of global inequality, and indirectly the overall trend, while inequality within countries remains unchanged in the relative approach, since country-level measures of inequality are scale-invariant.

The previous analysis was based on a measure of per capita income using the GDP series in the

WDI as the main reference since 1990, extended backwards with growth rates from the Maddison Project and, in a few cases, the PWT. In this section, I evaluate alternative measures based on GNI in the WDI, GDP (expenditure-side) in the PWT,[15] and GDP in the Maddison project. All measures are expressed in 2017US$, except the one based on the Maddison project, which is in 2011US$. Although these measures refer to a similar income concept, which one is chosen has important implications.

Figure 9 shows the relative average income trends for China and India (with 100 indicating the contemporary world's average). It becomes clear that the PWT as well as the Maddison series assign a higher initial relative income to China than WDI (both GDP and GNI), and therefore the sharp increase after 1990 was less pronounced (but still impressive). In the case of India, PWT and WDI are aligned in the 1990s, with the Maddison series exhibiting a higher level but in parallel with the others. The main discrepancy in this case comes from the fact that the WIID extends the WDI series backwards following mainly relative growth reported by the Maddison project. The latter does not reflect the large fall in relative income between mid-1970s and mid-1980s observed in the PWT. It is this fall that makes WDI and PWT be very similar after mid-1980s. This figure also display the gross income per adult in the WID.world, which will be further discussed in the next section. This series seems to be aligned, to some extent, with PWT (China) and Maddison (India) respectively.

Given the important role of China and India, how do these discrepancies affect global trends in inequality? Figure 10 displays the corresponding trends for overall inequality using these different income measures (between-country is shown in Figure A4). It turns out that the choice between WDI GNI or GDP is not very much relevant in terms of both levels and trends of global inequality. The use of the Maddison Project GDP series seems to affect the levels (inequality is lower, likely consequence of being based on 2011 PPP) but not the trends. However, the use of the PWT GDP (and WID.world gross income) instead has an important effect. The increase in the income share of the 40 per cent of the global population living in the poorest countries and therefore the decline in inequality between countries as measured by the Gini index, is postponed to 2000 (instead of mid-1970s and early 1990s respectively). This is also automatically transmitted to overall inequality.

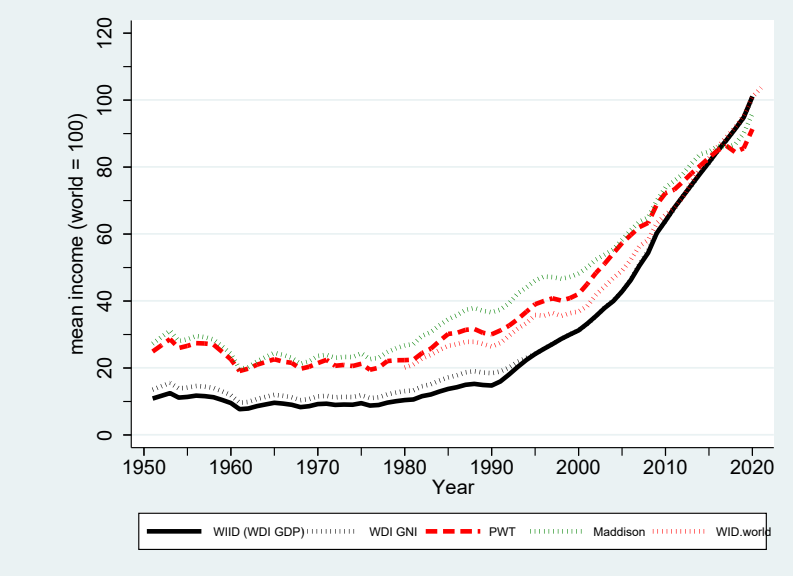
As a result, this adds more controversy to what happened with relative inequality in the 1980s and, especially, 1990s, even conditional on specific distributive views. Inequality, as measured by the

[15] The correlation between 'expenditure-side' and 'output-side' GDP in PWT is almost 1, so which one is chosen is irrelevant in this context.

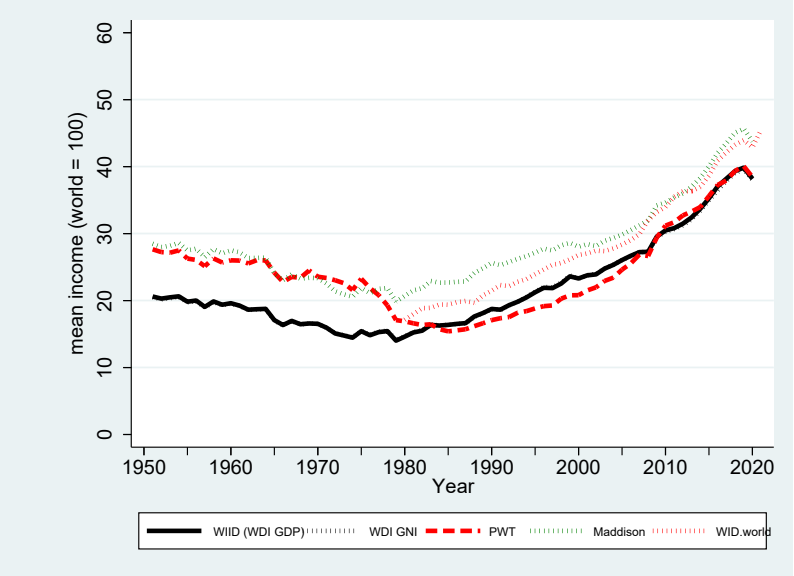
Gini index, declined in the 1990s based on WDI or Maddison, but increased based on the PWT (and WID.world). Noteworthy, the sharp decline in between-country and overall global inequality after 2000, seems to be more aligned among the different measures of income.

Figure 9: Mean income per capita in China and India, various alternative series

a. China



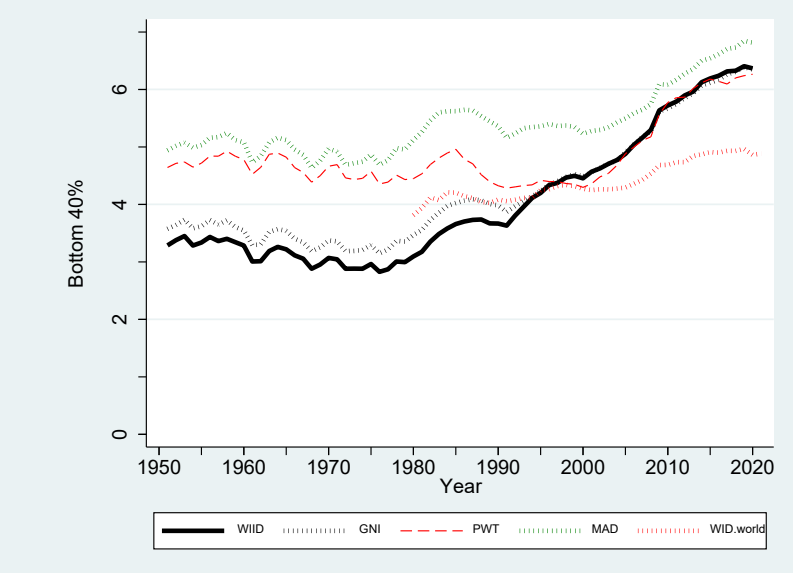
b. India



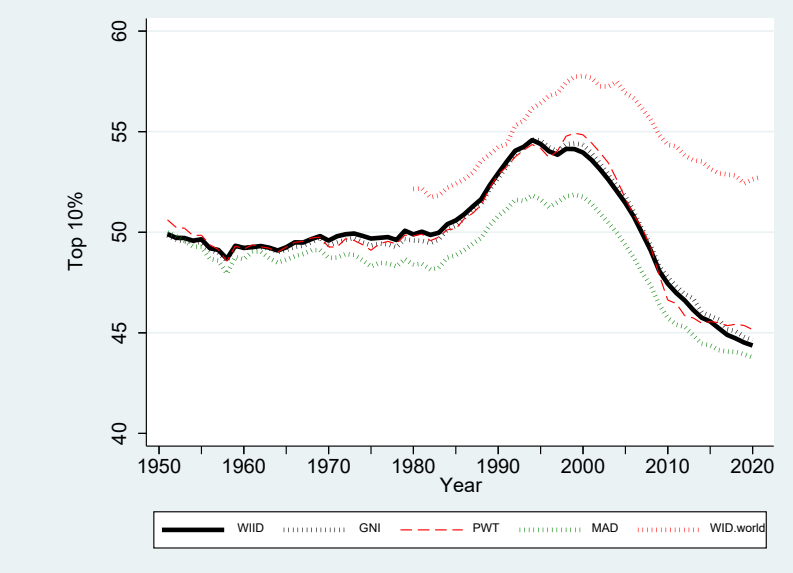
Source: author's construction (see data section).

Figure 10: Global overall inequality using various measures of per capita income by country

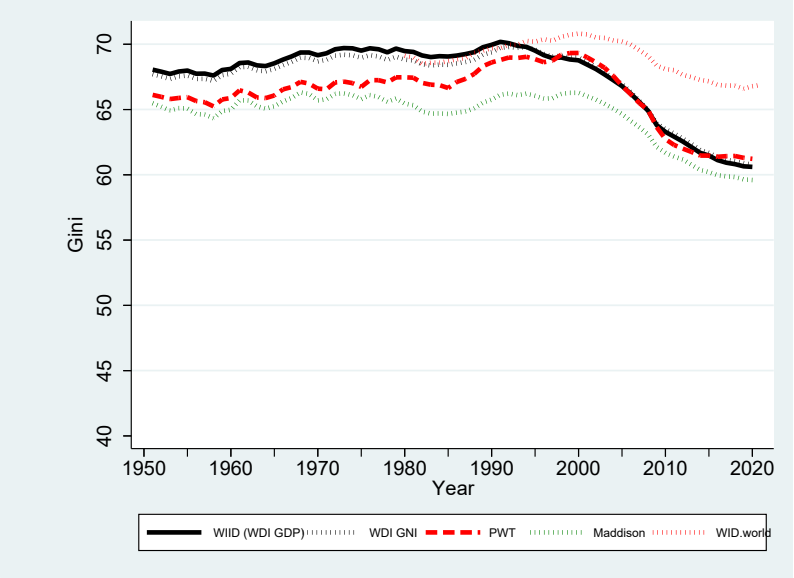
a. Income share of the bottom 40 per cent



b. Income share of the top 10 per cent



c. Gini



Source: author's construction (see data section).

8 Sensitivity of global inequality to correcting within-country distributions for the underestimation of the top income shares

One well-known limitation of the use of survey data to estimate inequality in a country is the potential underestimation of the income share of the very rich. The rich may be underrepresented in the final sample as the result of their small population size (in the absence of oversampling) or of their higher non-response rate. This is aggravated by the underestimation of specific income sources, disproportionally accrued by the very rich, like capital or business incomes. The result of this most certainly is the underestimation of inequality, the magnitude of which can vary from country to country or over time, depending, among other things, on the quality of the survey data collection process, since in some countries the problem is mitigated by integrating information from reliable administrative sources.

Picketty (2001) initiated a growing branch of the literature focusing on the estimation of the long-term trend of top incomes using tabulated income tax data, especially in advanced economies. This research initially led to the World Top Incomes Database, which Anand and Segal (2015) used to evaluate the impact on global inequality of adding the top 1 per cent in the dataset (or regression-based imputations) to survey incomes. Other studies in the global inequality literature have used alternative approaches for similar purposes. Lackner and Milanovic (2016) and Milanovic (2022) directly imputed the gap between national accounts private consumption and household survey income to the richest ten per cent in each country using a Pareto distribution. Jordá and Niño-Zarazúa (2019) estimated the Lorenz curves using instead a fully parametric model, fitting a

Generalized Beta 2 distribution above different cut-off quantiles.

The literature on top incomes has evolved in most recent years, merging the information from administrative records, national accounts, and household surveys in a flexible way, allowing to expand the number of countries, leading to WID.world, that includes a series of the distribution of gross income per adult at the percentile level (with additional breakdowns of the top percentile) between 1980 and 2019 in a large number of countries (with estimates for the global distribution). These distributions are heavily imputed, and the quality of these imputations is obviously conditional on the quantity and quality of the original available data which is quite heterogenous.

In this section, I analyse to what extent the global inequality trends described earlier would be affected assuming a higher concentration of income at the top than resulting from household surveys. Taking advantage of the most recent expansion of the coverage of the WID.world, the percentile distribution in each country after 1980 in the WIID is corrected here by replacing the income share of the top 1 per cent with the corresponding value estimated by WID.world. The income share of the rest of percentiles is rescaled proportionally to add up to 100, while the average income remains unchanged. The construction of this hybrid dataset is not exempt of problems, like ignoring the fact that both sources reflect the distribution of different welfare concepts and reference populations (net income per capita among all people in the WIID versus gross income per adult in the WID.world). Also, the country and time coverage of the latter is still more limited than the former (also including more extrapolated observations). The distribution of countries with no information in the WID.world will be kept unadjusted in the WIID, so the hybrid dataset has the same population coverage as in the WIID, avoiding a country composition bias conditioning the results. Despite all these caveats, this simple exercise is valuable to evaluate the direct impact of correcting the top incomes on global inequality as estimated from surveys, ceteris paribus, helping to reconcile the empirical evidence mainly based on survey data with that one based on these corrected distributions and with emphasis on the top income shares. Note that this hybrid distribution still differs from WID.world in other key aspects, including country population and mean income. The added value of this exercise is precisely to isolate the impact of only correcting survey estimates with higher top incomes while leaving the rest of methodological features in WID.world aside.

Figure 11 shows the trend of various global income shares and inequality measures in the WIID, the WID.world, and the hybrid distribution. It becomes clear that, as one could expect from the higher income concentration at the top, the corrected hybrid global distribution exhibits higher inequality than the survey based WIID, and this explains most of the gap with the WID.world global estimates. The trends seem to be less affected though, except in extreme cases.

It also reveals that by just replacing the income share of the top 1 per cent in each country, the gaps in the level and trend of the income share of the global top 1 and top 10 per cent between the WIID and WID.world are almost eliminated. This confirms that the main discrepancy in the estimate of the global top 10 per cent incomes in both sources originates at the very top 1 per cent of each country distribution.

In the case of the Gini index, for example, the impact of correcting within-country top incomes (the gap between the hybrid WIID and the WIID) accounts for 1.7 Gini points in 1980 and increases to 3.9 in 2019, with the largest growth being observed between 1995 and 2007. Consequently, the evolution of inequality over time is also affected but to a much lesser extent, with both distributions (WIID and hybrid) showing a similar pattern: some initial stability that is followed by a decline after 1991. The magnitude of the decline after 1991 is, obviously, smaller in the hybrid distribution, 7.4 versus 9.5 Gini points, but still substantial.

These estimates are quite in line with Anand and Segal's (2015) for 1988-2005, who followed the closest approach (also in Figure 11). They also fall in between those provided by Lackner and Milanovic (2015) and Milanovic (2022), while are way below those in Jordá and Niño-Zarazúa (2019) when they impute the top 1 per cent using a parametric GB2 method that, unlike the other cases, does not rely on information from actual administrative data and/or national accounts.

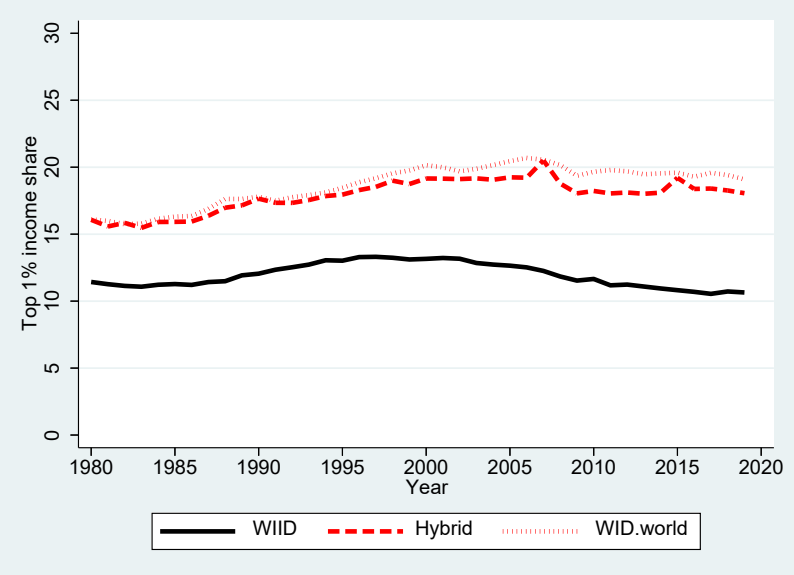
Trends for other indices show a similar impact of correcting inequality for the underestimation of top incomes (Figure A5). The MLD of the WIID hybrid distribution declines between 1980 and 2019 by 31 MLD points versus 37 in the WIID, while the fall in the Theil index after 2000 is 14 versus 23 respectively. Overall, this simple exercise suggests that the evolution in global inequality after 1980, conditional on our distributive sensitivities, is generally robust to correcting for the underestimation of the top incomes at the country level, even if the level of inequality is generally higher and the fall smaller.

A full exercise of comparing the WIID Companion and WID.world is beyond the scope of this paper, and discrepancies may originate in other ways that need to be disentangled. But it is also noteworthy that both series agree in the decline of global inequality since the early 2000s if not too much emphasis is put on the top of the distribution, i.e., using Gini or MLD, but not the Theil or the income share of the top 10 per cent. The main discrepancy in the evolution of the Gini index occurs between mid-1990s and mid-2000s but the hybrid distribution unravels that this discrepancy is driven by inequality between countries, in line with the discussion in the previous section, rather than a higher income concentration at the top of the distribution in each country. When our views on inequality give more emphasis to the dynamics at the top, i.e., using the Theil index or the income share of top 10 per cent, the WIID and WID.world also agree on the decline

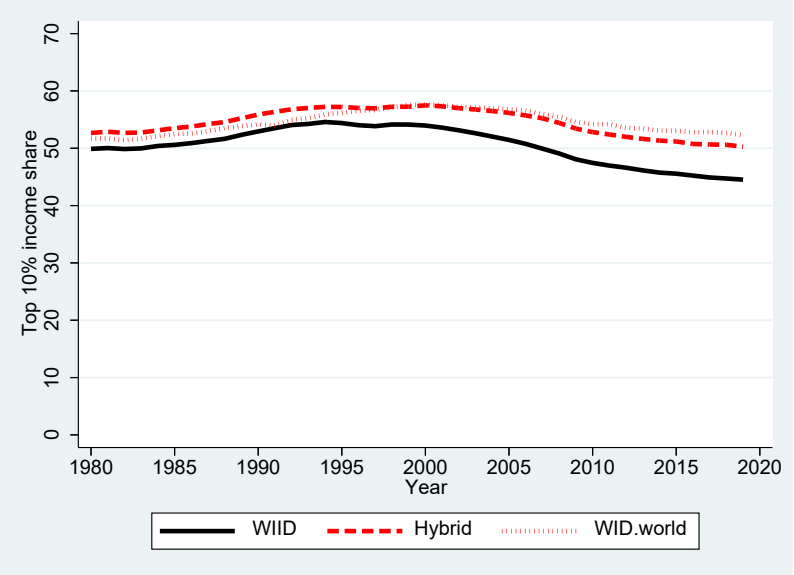
in global inequality since mid or late 2000s. Only when the attention is focused on the income share of the very top (i.e., like the top 0.1 per cent) global inequality has generally increased in recent years according to the WID.world, something that is also reflected in the trend with GE(2).[16]

Figure 11: Global inequality measures before (WIID) and after correcting for within-country top incomes (hybrid dataset)

a. Top 1 per cent income share

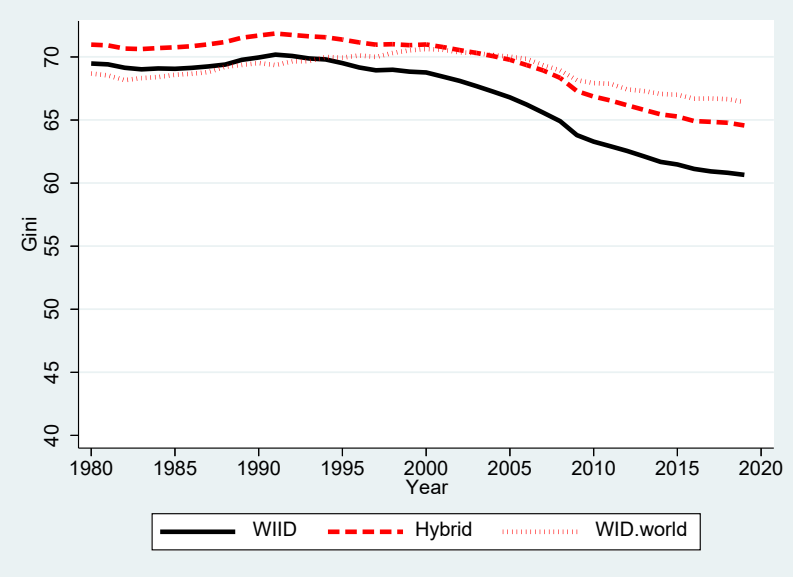


b. Top 10 per cent income share

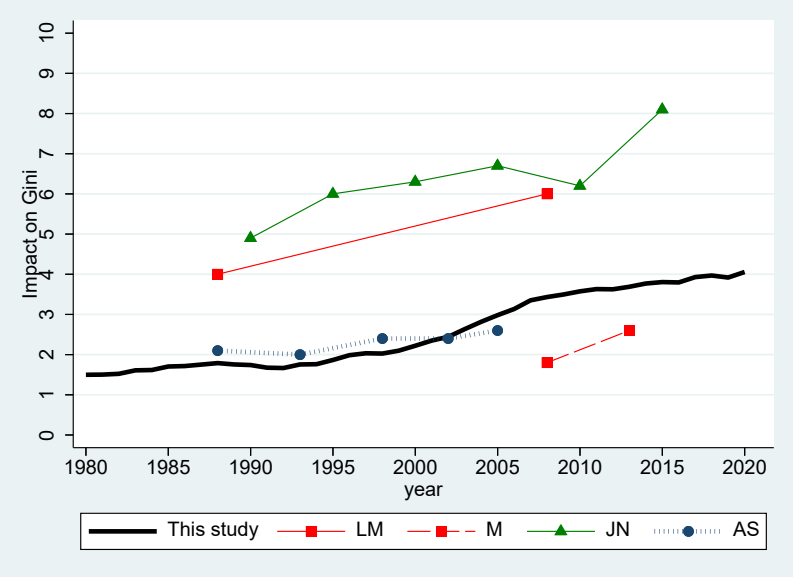


[16] Note that in the context of the global distribution in WID.world, the GE(2) is basically reflecting the income share of the top 0.1 per cent (with a 99 per cent of correlation).

c. Gini



d. Impact of correcting for within-country top incomes in global Gini: this study and others



Source: Author's construction (see data sections). Comparison with WID.world and reported data from Anand and Segal (2015) [AS], Lackner and Milanovic (2017) [LM], Milanovic (2022) [M], and Jordá and Niño-Zarazúa (2019) [JN].

9 Conclusions

Access to better data has improved our understanding of inequality trends globally between and within countries, especially during the last two decades. However, data on country income distributions based on household surveys are still sparse, and the information is dispersed and heterogenous.

In this paper, I presented a new integrated dataset which enables more consistent comparisons of country and global income distributions obtained from the main international and country sources

using survey data. This new database complements the WIID by simplifying the information selecting series that best describe the income distribution trend in each country for the longest possible period with the highest possible consistency. It makes the minimum necessary adjustments to the original survey data to integrate the information in a way that makes it more comparable across countries and over time, while maintaining the main data patterns that are already found in the original data based on household surveys. For that, the distribution will always refer to the same welfare concept, i.e. household net income per capita at the country level. These integrated series for country-level income distributions over time were aggregated to produce the global income distribution, where inequality is measured among the world population regardless of the place where they live. They also enable the study of between- and within-country components separately, disaggregating distributions by region and income group.

At the country level and globally, the new dataset enhances the information that used to be available in the WIID by providing the entire distribution of income at the percentile along with a variety of indicators of the inequality measures. This facilitates more comprehensive and integral distributive analysis within and across countries or worldwide which can identify the degree of consensus about how to determine the type of distributional changes that take place. Rather than imposing one specific approach, it gives users the flexibility to choose their own, with the implicit or explicit value judgements that come with it, admitting that there are different legitimate distributive sensitivities (see a recent discussion in Ravallion 2021 or Gradín et al. 2021b).

Using this dataset, I have analysed the trends in the global income distribution using a comprehensive approach that embraces competing inequality views, including absolute and relative inequality evaluations of income changes, as well as different sensitivities to the performance of different parts of the distribution over time. While some people may pay attention to dollar amount of distances between people, others will focus on relative distances instead. Similarly, while some people may prioritize the relative or absolute improvement of the poor, others will legitimately be more concerned with the accumulation of income among the most affluent. Rather than imposing specific inequality views, the approach followed here allows us to investigate to what extent we can reach a consensus, regardless of our views on inequality, about what has happened to the global distribution of income. And when that consensus is not possible, it makes it possible to clarify where and how the discrepancy occurs.

The results shown here indicate that it is only when income distances among people are evaluated in absolute terms that one can summarize the last seven decades using a single statement. Inequality unambiguously increased almost continuously between countries and within countries, and therefore globally. It is only deep recessions that seem to have temporarily reduced absolute

income distances among people across the world.

Demanding higher income increases among the poor to consider that inequality was reduced in a context of strong global economic growth may seem too demanding or unfeasible for some people. Instead, whenever income distances are evaluated in relative terms, the story becomes more nuanced. The results using the Lorenz criterion unambiguously indicate a decline in relative inequality in the long-term (i.e., 1950–2020). This criterion does not help much in identifying the trend for shorter periods due to the lack of Lorenz dominance because we can observe simultaneously equalizing and disequalizing relative income changes at different parts of the distribution, and the magnitude and composition of these changes differ over time. But the lack of Lorenz dominance does not prevent a high level of agreement among most relative inequality views and measures. The preliminary results thus point to two well-distinguished phases.

The first decades are characterized by some overall stability, with a slightly upward trend, driven by the fact that the main developing regions, particularly China and India, were left behind in the post-war sustained economic growth that the world experienced, leading to increased inequality between countries. This upward inequality trend was aggravated by population growing faster in the developing world than in Europe. It was, however, largely compensated for by lower inequality within countries, particularly China and Indi, therefore the net overall effect being of a small change.

In the most recent decades, we observe a sharp decline in global inequality after the previous trends were totally reversed. This period is characterized by a large decline in inequality between countries, driven by stronger economic growth in emerging countries, especially in China and, to a lesser extent, India. This decline in global inequality between countries is only partially compensated for by the disequalizing effects of faster population growth in sub-Saharan Africa, which has become the poorest region, and country inequality growing within countries in several areas but particularly in China and India.

The between-country trend has been clearly decelerating in the most recent years as China reached the global mean and can be expected to be eventually reversed if the country keeps growing faster than the rest, as China's contribution to inequality is already close to zero with various indices and will increase in the future as the country moves above the global mean income. However, the projections used in this paper suggest that this inequality between countries will continue declining at least until 2027, mainly pushed by the strong growth in India, and likely dragging overall inequality down as well.

The turning point after which the global trend shifted to a decline varies between the mid-1970s, if we pay more attention to the relatively good performance of the world's bottom 40 per cent,

and the late 1990s, if we account for the higher concentration at the top 10 per cent of the income distribution which occurred in the 1980s and 1990s. The latter was due to the collapse of socialist regimes in Eastern Europe as well as increasing concentration at the top in several countries. With less sensitivity to either end of the distribution, the decline in global inequalities would have started in the early 1990s. Therefore, this intermediate period between mid-1970s and late-1990s is the most ambiguous in terms of the direction of the inequality trend based on people's distributive sensitivities. It is also interesting to note that these discrepancies among different inequality sensitivities arise mainly from how the different indices assess the trend in inequality between countries rather than within countries. For the latter, the level of agreement with the direction is higher, even if the magnitude varies across indices.

One important point of discrepancy when assessing the global trends emerges if we pay much closer attention to the very bottom of the income distribution. In that case, inequality sharply declined in the first decades until around 2005, when it started to increase driven by stagnation in the incomes of the poorest 5 per cent of the world's population.

Apart from distributive sensitivities, the methods matter also to some extent to assess the trend in relative inequality before 2000, with the trend in the next two decades being more robust. Inequality before 2000 was more clearly increasing when relying on China's growth performance according to PWT compared with using WDI estimates instead. Inequality was higher and the decline smaller if country distributions are adjusted for possible underestimation of the incomes of the top 1 per cent. The decline in inequality after 2000 is also generally robust to the use of a different database like the WID.world, which deviates the most from the distributional patterns observed in household surveys, with more discrepancies arising with a higher sensitivity to the concentration of income among the world's richest, with no decline being observed in the extreme case of focus on the 0.1 per cent.

Overall, when it comes to assess the global trend in inequality over the last seven decades, what matters the most is how we evaluate income changes (absolute or relative views) and how much emphasis we put on the relative performance of the very poor (e.g., bottom 5 per cent). For the 1980-2000 period, it is also key how me measure country mean incomes, particularly the growth path followed by China over those years. Regarding the trend in global inequality after 2000, it also matters if we are particularly concerned with accumulation of income among the very rich (e.g., top 0.1 per cent) and if we rely on the data corrections for their underestimation in household surveys.

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Appendix 1 - METHODS

Appendix 1a. Between and within-country components of inequality

Let $y = (y^1, \dots, y^K)$ denote the global income distribution made up of K countries, where $y^k = (y_1^k, \dots y_{n_k}^k)$ indicates the distribution of country k with population n^k, total population is then $n = \sum_{k=1}^{K} n^k$. Furthermore, $I(y)$ denotes any global inequality measure computed on incomes y.[17] $\bar{y}$ denotes the global mean, while $\bar{y}^k$ is the corresponding mean for country k.

Now, let us consider the distribution in two counterfactual situations.

The first counterfactual distribution is given by $y_b = (y_b^1, \dots, y_b^K)$, where in the distribution of each country k, $y_b^k = (\bar{y}^k, \dots, \bar{y}^k)$, the income of every person has been replaced by the country's mean income $\bar{y}^k$, while keeping inequality between countries unchanged. That is, this is the 'between-country global income distribution', in which all existing inequality within countries has been removed, i.e., $I(y^k) = 0$ for all countries.

A second counterfactual distribution is given by $y_w = (y_w^1, \dots, y_w^K)$, where in the distribution of each country, $y_w^k = y^k \frac{\bar{y}}{\bar{y}^k} = (y_1^k \frac{\bar{y}}{\bar{y}^k}, \dots, y_{n^k}^k \frac{\bar{y}}{\bar{y}^k})$, the income of every person (or percentile) has been rescaled by the same factor $\frac{\bar{y}}{\bar{y}^k}$ to have the global mean income $\bar{y}$, keeping relative inequality within each country unchanged. In the case of absolute inequality this is done by adding the differential instead, obtaining $y_{aw}^k = y^k + (\bar{y} - \bar{y}^k)$. This is the 'within-country global income distribution', in which all existing inequality between countries has been removed without affecting inequality in each country (all countries have now the same mean and therefore global inequality across countries using those means is zero).

Measures of inequality computed on y_b, $I(y_b)$, have been widely used as a true measure of between-country inequality. Alternatively, inequality between countries can be obtained as the inequality that is gone after equalising average incomes across countries: $I(y) - I(y_w)$.

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[17] For a discussion of the underlying theory of inequality decompositions, see, for example, the discussion and related literature in Chakravarty (2009).

Similarly, $I(y_w)$ can be understood as the true measure of inequality within countries, while the inequality that is gone after equalising within-country incomes can also be interpreted as a measure of within-country inequality: $I(y) - I(y_b)$.

In this paper, I use $I(y_b)$ and $I(y_w)$. The corresponding alternative measures, $I(y) - I(y_b)$ or $I(y) - I(y_w)$, can be easily inferred by comparing overall inequality and each component.

It is a known fact that the only inequality index in which inequality is the sum of the true between and within country inequality as defined above, is the Mean Log Deviation (GE_0): $GE_0(y) = GE_0(y_b) + GE_0(y_w)$. That is, this index is additively decomposable, and the magnitude of each term is the same obtained using both alternatives (path independence). Other indices have other well-known decomposability properties, but only this one guarantees that both terms are pure, in the sense that the within-country term is not contaminated with between-country inequalities and vice versa.

In the case of other members of the GE family, which verify additive decomposability, what is usually interpreted as the 'within' component is $GE_\alpha(y) - GE_\alpha(y_b) = \sum_{k=1}^{K} \frac{n^k}{n} \left(\frac{\bar{y}^k}{\bar{y}}\right)^\alpha GE_\alpha(y^k)$, which is a weighted sum of country inequality, with weights being a function of country means (except when $\alpha = 0$, i.e., MLD). These terms, therefore, are not true within-country in the sense that they reflect prevailing inequality across countries' means too.[18]

In the case of the Gini index, the decomposability is more complex, since it also depends on the level of overlapping among country income distributions along the income space.

Note also that for all members of the GE family, the true within-country term (after the mean income has been equalised across countries) is just the population weighted sum of country inequality: $GE_\alpha(y_w) = \sum_{k=1}^{K} \frac{n^k}{n} GE_\alpha(y^k)$.

To cope with this heterogeneity in decomposability properties, I also use an additional estimate based on the Shapley decomposition, in line with Davies and Shorrocks (2021).

The Shapley decomposition (Chantreuil and Trannoy, 2013; Shorrocks, 2013) is a simple method that allows us to obtain a consistent decomposition for all indices, with both terms adding up to

[18] It also raises some normative issues, since inequality in rich countries has a higher contribution to overall within-country inequality than inequality in poor countries.

overall inequality, regardless of their decomposability properties. It means, in this context, to just compute the average between the two possible estimates for each component:

$$I(y) = S_b(y) + S_w(y);$$

$$\text{with } S_b(y) = \frac{1}{2}\big(I(y_b) + I(y) - I(y_w)\big);$$

$$\text{and } S_w(y) = \frac{1}{2}\big(I(y_w) + I(y) - I(y_b)\big).$$

Only in the case of the Mean Log Deviation (GE_0), it happens that $S_b(y) = I(y_b)$ and $S_w(y) = I(y_w)$.

The importance of each component is then estimated as the percentage of total inequality:

$$s_b = 100S_b(y)/I(y)\ ;\ s_w = 100S_w(y)/I(y);\ s_b + s_w = 100.$$

Note that $s_b > s_w$ if and only if $I(y_b) > I(y_w)$.

Appendix 1b. Country contributions to inequality

To identify the individual contribution of a country to global inequality in a consistent way, with the sum of all contributions adding to the total level, I followed the approach in Gradín (2020), where any inequality measure is decomposed as the sum of group contributions:

$$I(y) = \sum_{k=1}^{K} \frac{n^k}{n} \overline{RIF}^k$$

Where $\overline{RIF}^k = \frac{1}{n^k}\sum_{i=1}^{n_k} RIF\ \left(y_i^k, I(y)\right)$, is the mean value of the Recentred Influence Function of global inequality index $I(y)$, estimated across country incomes, $y_i^k, i = 1, \dots, n^k$.

Furthermore, to separate the changes in the contribution of a country that is driven by demographic trends, after adding and subtracting inequality in a counterfactual distribution $\frac{n_0^k}{n_0}\overline{RIF_1}^k$ that keeps the initial population shares constant but uses the final average contribution, we can define the change of inequality between year 0 and 1 as:

$$I(y_1) - I(y_0) = \sum_{k=1}^{K}\left(\frac{n_1^k}{n_1}\overline{RIF_1}^k - \frac{n_0^k}{n_0}\overline{RIF_0}^k\right)$$

$$= \sum_{k=1}^{K}\left(\frac{n_1^k}{n_1} - \frac{n_0^k}{n_0}\right)\overline{RIF_1}^k - \sum_{k=1}^{K}\frac{n_0^k}{n_0}\left(\overline{RIF_1}^k - \overline{RIF_0}^k\right)$$

Where $\frac{n_1^k}{n_1}\overline{RIF_1}^k - \frac{n_0^k}{n_0}\overline{RIF_0}^k$ is the total contribution of country *k* to the change in inequality, while $\left(\frac{n_1^k}{n_1} - \frac{n_0^k}{n_0}\right)\overline{RIF_1}^k$ is the contribution to the compositional effect (exclusively driven by changes in country's population) and $\frac{n_0^k}{n_0}\left(\overline{RIF_1}^k - \overline{RIF_0}^k\right)$ is the contribution to the distributional effect (due to changes in country's incomes).

Finally, combining this with the decomposition of any index into its Shapley between and within-country components, the same is done separating the effects from each component:

$$I(y_1) - I(y_0) = S_b(y_1) - S_b(y_0) + S_w(y_1) - S_w(y_0) =$$
$$= \sum_{k=1}^{K}\left(\frac{n_1^k}{n_1} - \frac{n_0^k}{n_0}\right)\left(\overline{RIF_{b_1}}^k + \overline{RIF_{w_1}}^k\right) + \sum_{k=1}^{K}\frac{n_0^k}{n_0}\left(\overline{RIF_{b_1}}^k - \overline{RIF_{b_0}}^k\right)$$
$$+ \sum_{k=1}^{K}\frac{n_0^k}{n_0}\left(\overline{RIF_{w_1}}^k - \overline{RIF_{w_0}}^k\right)$$

Therefore, the change in total inequality is the sum of three terms. These terms indicate the sum of country contributions towards a compositional effect (i.e., changes in the distribution of population across countries over time, keeping income distributions constant within countries), and the corresponding contributions to the distributional effects between countries and within countries respectively (i.e., changes in global inequality between countries and within countries with constant country populations).

Appendix 2 – INCOME GROWTH

The period from 1950 to 2020 is characterized by strong and sustained global economic growth of about 2 per cent per capita annually, with the highest level of growth seen in the first 30 years (2.7 per cent on average in the 1950s, 3.3 per cent in the 1960s, and 2.3 per cent in the 1970s). The economy then slowed down to its lowest level of growth after the oil crises: the 1980s and 1990s (around 1 per cent). Growth rates rose again to 2.3 per cent in the 2000s and 2010s. There were a few other episodes in which global per capita income declined or the annual growth rate fell below 1 per cent, corresponding to the main global economic crises, such as in 1957–58, 1973–75, 1979–83, 1989–93, or 2008–09. More recently, income fell in 2020 by 4.2 per cent, with the most recent IMF projections indicating a strong recovery already in 2021 (5 per cent), which would be followed by growth around 2.2 per cent at least until 2027.

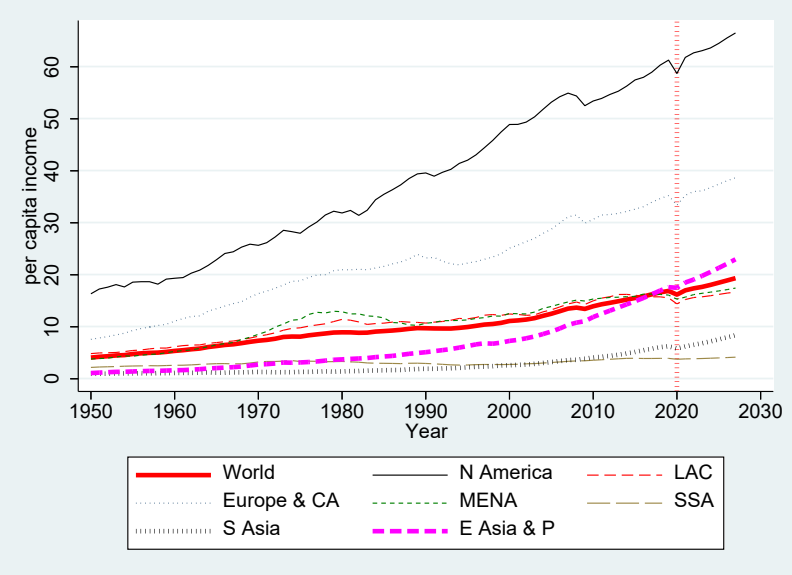
This generally strong economic growth trend was, unsurprisingly, quite heterogenous, which anticipate drastic changes in inequality between countries. The trend was first much stronger in North America and Europe, with much more rapid growth recently being experienced in East Asia, particularly after the 1990s, followed by South Asia (Figure 1a). Growth was much weaker in sub-Saharan Africa over the entire period, with only an annual 0.8 per cent growth rate on average, as opposed to 4.1 per cent in East Asia and Pacific (5.7 per cent in China), 2.7 per cent in South Asia (2.9 per cent in India), and between 1.6 and 2.2 per cent in the other regions (1.9 per cent in the USA) (Figure A1). Per capita average growth rates were negative in some countries, mainly in sub-Saharan Africa[19] (e.g., Central African Republic, Democratic Republic of the Congo, Liberia, and Madagascar), as well as in Haiti or North Korea. The population of countries exhibiting negative growth rates over the period analysed was 174 million in 2020 (2.2 per cent of the world's population), and 627 million (8 per cent) if we include people in countries with an average growth rate below 1 per cent. The projection for the next years shows that, after economies recover from the COVID pandemic, in which India was particularly hit and the sub-

[19] Within the sub-Sahara African region, there were also stunning differences, with much higher growth rates, 3 per cent or above, in Botswana, Equatorial Guinea, Eswatini, and Mauritius.

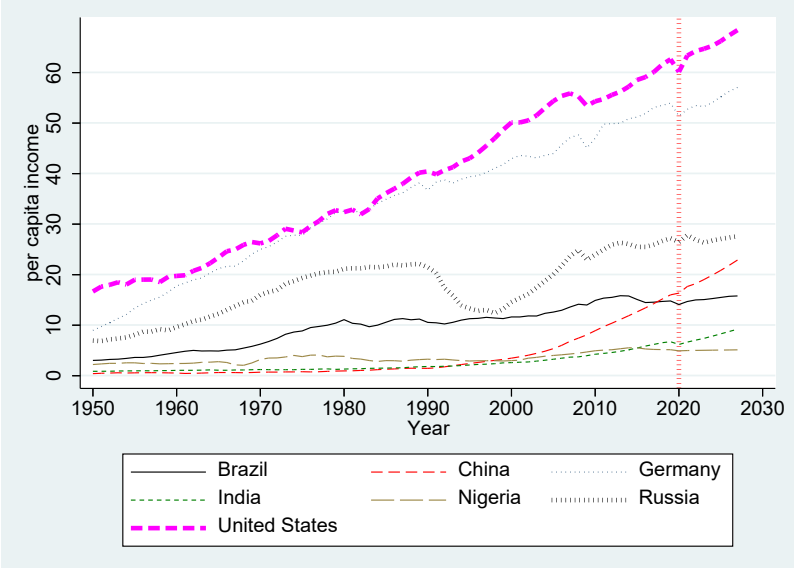
Saharan region was less affected, this heterogeneity is expected to remain in similar terms, with faster growth in East and South Asia, more modest in sub-Saharan Africa.

Figure A1: Trend in per capita income 1950-2027

a. World and geographical regions



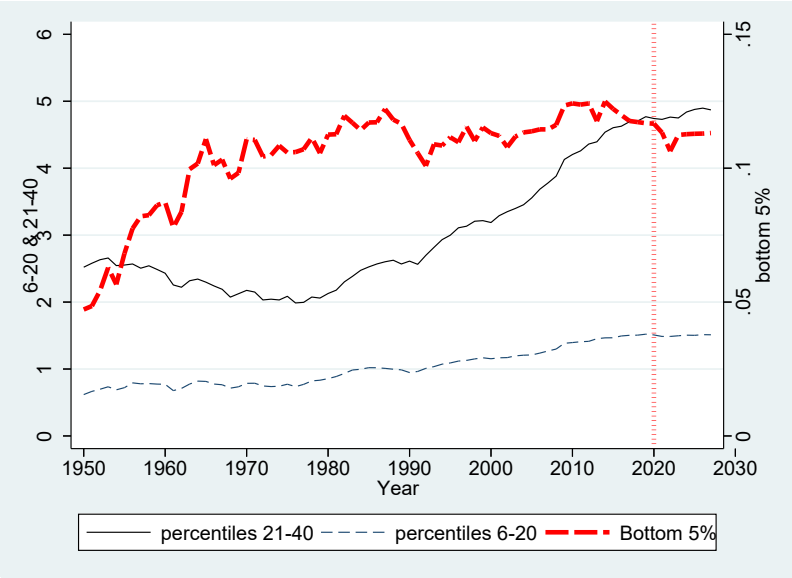
b. Selected countries



Source: author's construction (see data section).

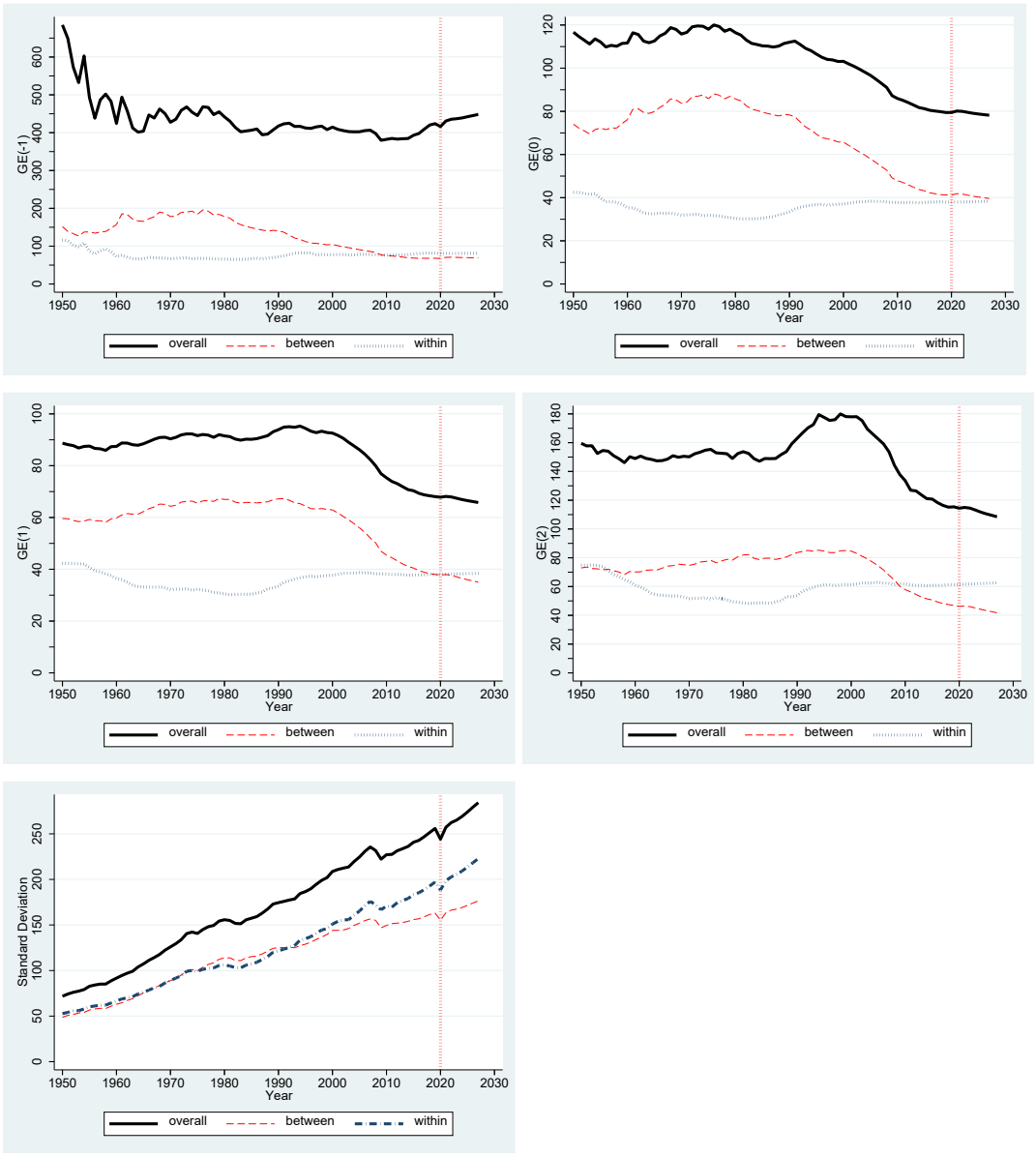
Appendix 3 – COMPLEMENTARY RESULTS

Figure A2. Detailed income shares, bottom 40 per cent



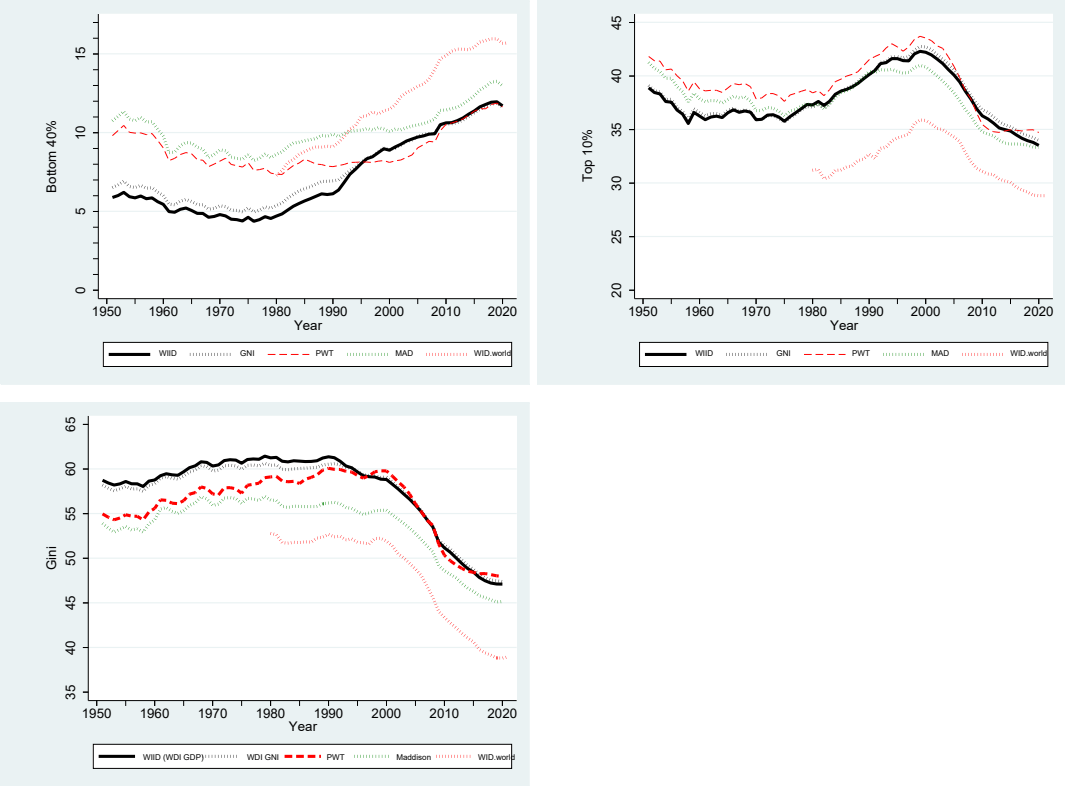
Source: author's construction (see data section).

Figure A3: Decomposition of overall global income inequality into between-country and within-country inequality, GE family (relative) and standard deviation (absolute)



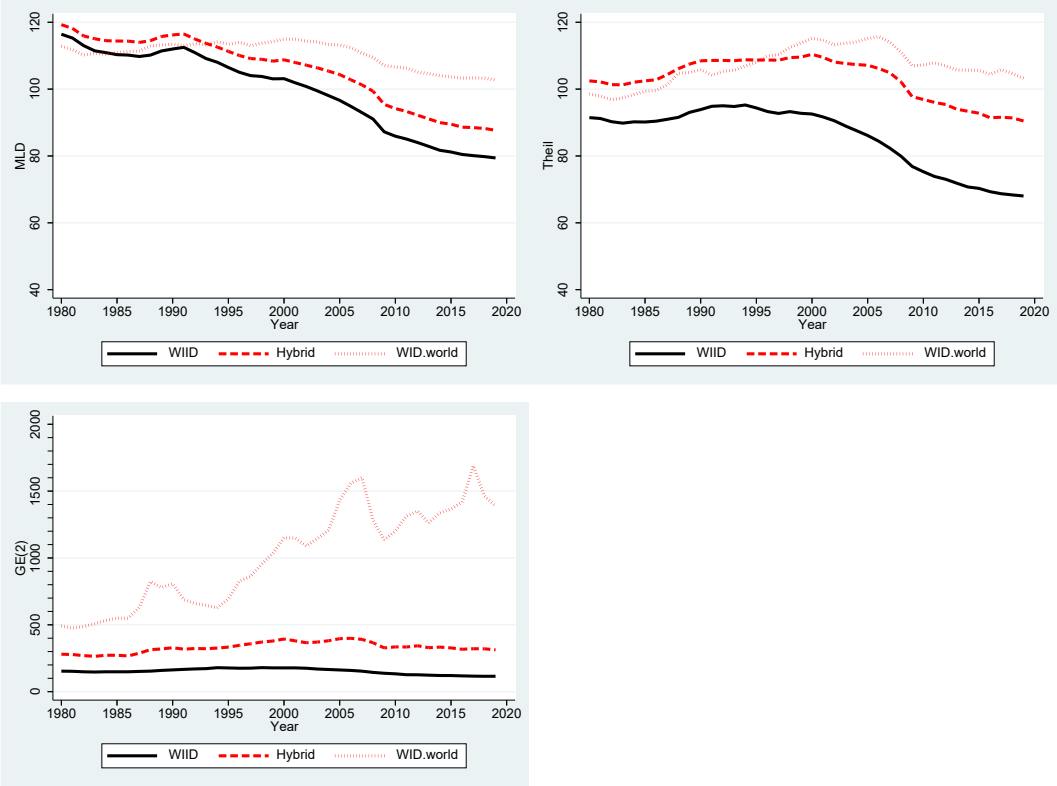
Source: author's construction (see data section).

Figure A4. Global inequality between countries using various measures of per capita income by country



Source: author's construction (see data section).

Figure A5. Inequality measures (GE family) before (WIID) and after correcting for top incomes (hybrid dataset)



Source: author's construction (see data section).

Table A1: Lorenz dominance (crossing percentiles) by decade: overall distribution

	1950	1960	1970	1980	1990	2000	2010
1960	-44 80						
1970	-37 88	2 -28 95					
1980	-38 90	3 -32 95	5 -41 95 -97				
1990	-51 98	2 -56	-2 5 -69	-3 7 -72			
2000	-67	3 -70	5 -76	-3 5 -78	4 -84		
2010	decline	2	3	6	5	6	
2020	decline	3	5	2 -3 5	4	3	10

Note: decline = Dominance (unambiguous decline in inequality). Numbers indicate the percentile at which the most recent curve crosses the older one from below (positive) or from above (negative).

Source: author's construction (see data section).

Table A2: Lorenz dominance (crossing percentile), within-country distribution

	1950	1960	1970	1980	1990	2000	2010
1960	decline						
1970	decline	decline					
1980	decline	3	3 -7 13 -99				
1990	decline	9	increase	-3			
2000	decline	98	increase	-2	-3		
2010	decline	96	increase	-2	-2	-2 82	
2020	decline	96	increase	increase	2	76	26 -95 97

Note: decline/increase = Dominance (unambiguous decline/increase in inequality). Numbers indicate the percentile at which the most recent curve crosses the older one from below (positive) or from above (negative). The 2000 an 2020 curves almost fully overlap.

Source: author's construction (see data section).

Table A3: Contribution to global income inequality: changes over time by geographical region and selected countries, Gini index

	1950–80				1980–90				1990–2000				2000–20			
	T	B	W	C	T	B	W	C	T	B	W	C	T	B	W	C
World	1.27	3.19	-4.23	2.31	0.48	-1.06	1.00	0.54	-1.19	-3.41	1.72	0.51	-8.16	-11.51	1.80	1.54
North America	-1.83	-2.00	0.32	-0.15	0.45	0.43	0.06	-0.04	0.62	0.70	-0.13	0.05	-0.29	-0.05	-0.15	-0.09
United States	-1.80	-1.93	0.31	-0.18	0.44	0.41	0.08	-0.05	0.59	0.67	-0.12	0.05	-0.27	-0.04	-0.13	-0.09
Latin America and the Caribbean	0.69	0.09	-0.20	0.80	0.24	0.23	-0.05	0.07	0.10	-0.01	-0.01	0.12	-0.53	-0.38	-0.08	-0.08
Brazil	0.18	-0.06	-0.08	0.32	0.10	0.07	0.00	0.03	-0.02	0.01	-0.06	0.03	-0.22	-0.13	-0.01	-0.07
Mexico	0.17	-0.01	-0.05	0.23	0.06	0.04	-0.01	0.03	0.04	0.02	-0.01	0.03	-0.12	-0.12	-0.02	0.02
Europe and Central Asia	-2.31	-0.53	-0.14	-1.64	0.22	0.49	0.15	-0.41	-0.11	0.83	0.03	-0.96	-2.16	-1.23	-0.11	-0.82
Germany	-0.13	0.20	-0.02	-0.31	-0.07	-0.01	0.02	-0.08	0.02	0.11	-0.03	-0.06	-0.17	-0.04	-0.02	-0.11
Russia	-0.29	-0.10	0.05	-0.23	0.10	0.05	0.16	-0.11	-0.15	0.00	0.03	-0.18	-0.41	-0.14	-0.09	-0.18
Middle East and North Africa	0.79	0.21	-0.12	0.69	0.10	-0.19	-0.04	0.34	0.14	-0.10	0.01	0.23	0.33	-0.19	0.05	0.47
Sub-Saharan Africa	1.38	0.69	-0.19	0.89	0.89	0.21	0.02	0.66	1.13	0.33	-0.21	1.01	2.72	0.04	-0.23	2.91
Nigeria	0.13	0.17	-0.10	0.07	0.16	0.05	0.03	0.08	0.16	0.08	-0.06	0.14	0.30	0.06	-0.16	0.41
South Asia	2.19	1.96	-0.54	0.76	-0.01	-0.46	-0.09	0.53	0.45	-1.14	0.64	0.95	-0.99	-2.13	0.53	0.61
Bangladesh	0.42	0.25	-0.03	0.21	0.10	-0.03	0.03	0.10	0.08	-0.05	0.03	0.10	-0.16	-0.23	0.07	0.00
India	1.40	1.45	-0.45	0.39	-0.15	-0.35	-0.13	0.33	0.08	-1.03	0.57	0.53	-1.20	-1.91	0.54	0.17
Pakistan	0.26	0.12	-0.03	0.17	0.11	-0.07	0.01	0.17	0.19	-0.04	0.03	0.20	0.34	0.07	-0.07	0.34
East Asia and the Pacific	0.37	2.76	-3.36	0.96	-1.42	-1.77	0.96	-0.60	-3.52	-4.02	1.38	-0.88	-7.25	-7.56	1.78	-1.47
China	-0.16	3.03	-3.25	0.06	-1.35	-1.61	0.87	-0.61	-3.38	-3.85	1.35	-0.88	-5.99	-6.46	1.67	-1.21
Indonesia	0.40	0.16	-0.05	0.30	-0.14	-0.12	-0.02	0.00	-0.13	-0.15	0.02	0.00	-0.26	-0.50	0.24	0.00
Japan	-0.49	-0.51	0.10	-0.08	0.24	0.24	0.06	-0.06	-0.02	0.08	0.00	-0.09	-0.39	-0.21	-0.01	-0.17

Note: changes in the inequality index between initial and final year (RIF contributions). T=Total, B=Distributional effect between countries, W= Distributional effect within countries, C=Composition effect (change in population share).

Source: author's construction (see data section).

Table A4: Contribution to global income inequality: changes over time by geographical region and selected countries, MLD [GE(0)]

	1950–80				1980–90				1990–2000				2000–20			
	T	B	W	C	T	B	W	C	T	B	W	C	T	B	W	C
World	-0.21	12.21	-13.72	1.30	-4.42	-6.25	2.24	-0.41	-8.88	-13.15	2.98	1.29	-23.69	-27.97	-0.12	4.40
North America	-4.53	-4.69	-0.49	0.65	1.45	1.00	0.22	0.24	1.11	0.55	0.13	0.42	-3.44	-3.88	0.11	0.34
United States	-4.51	-4.55	-0.46	0.49	1.42	0.99	0.23	0.20	1.07	0.56	0.12	0.40	-3.25	-3.64	0.11	0.29
Latin America and the Caribbean	0.46	-0.29	-0.33	1.08	0.18	-0.27	0.30	0.15	0.43	0.12	0.15	0.17	-1.28	-0.12	-1.04	-0.12
Brazil	-0.01	-0.08	-0.34	0.40	0.13	-0.07	0.14	0.06	-0.07	-0.01	-0.10	0.04	-0.28	0.06	-0.24	-0.09
Mexico	0.34	0.04	-0.06	0.36	-0.02	-0.15	0.05	0.08	0.11	-0.01	0.05	0.06	-0.45	-0.21	-0.26	0.02
Europe and Central Asia	1.09	2.58	-0.64	-0.86	0.27	0.07	0.42	-0.22	-0.87	-0.67	0.56	-0.76	-5.30	-4.66	-0.35	-0.29
Germany	1.04	1.60	-0.05	-0.50	-0.26	-0.14	0.01	-0.12	-0.16	-0.09	0.01	-0.08	-0.92	-0.86	0.04	-0.10
Russia	0.71	0.62	0.00	0.09	-0.15	-0.52	0.36	0.01	-1.00	-1.09	0.20	-0.11	-0.27	0.15	-0.33	-0.08
Middle East and North Africa	1.52	0.31	-0.13	1.34	-0.67	-1.01	-0.13	0.46	0.16	-0.09	-0.05	0.30	0.35	-0.10	-0.11	0.55
Sub-Saharan Africa	3.65	2.54	0.17	0.95	2.78	1.48	0.37	0.93	2.71	1.73	-0.78	1.76	4.34	-0.41	-0.41	5.16
Nigeria	0.27	0.32	-0.03	-0.02	0.49	0.32	0.12	0.05	0.20	0.34	-0.28	0.14	-0.06	-0.07	-0.35	0.36
South Asia	5.69	8.54	-2.39	-0.46	-3.29	-2.57	-0.73	0.01	-0.04	-2.15	1.15	0.95	-4.92	-5.97	0.95	0.10
Bangladesh	1.28	1.09	0.00	0.19	0.16	0.02	0.06	0.08	0.11	-0.11	0.10	0.12	-0.64	-0.76	0.19	-0.07
India	3.50	6.52	-2.35	-0.66	-3.28	-2.38	-0.82	-0.08	-0.78	-2.26	1.07	0.41	-4.63	-5.15	0.86	-0.34
Pakistan	0.48	0.39	-0.02	0.11	-0.03	-0.21	0.03	0.15	0.26	0.10	-0.04	0.20	0.45	0.18	-0.06	0.34
East Asia and the Pacific	-8.09	3.21	-9.91	-1.39	-5.14	-4.95	1.80	-1.99	-12.38	-12.64	1.81	-1.55	-13.44	-12.83	0.73	-1.34
China	-10.83	1.19	-9.93	-2.09	-5.67	-5.58	1.78	-1.87	-11.94	-12.23	1.75	-1.46	-10.05	-9.97	0.80	-0.89
Indonesia	0.25	0.17	0.02	0.06	-0.46	-0.28	-0.09	-0.09	-0.21	-0.09	-0.07	-0.06	-0.16	-0.36	0.26	-0.06
Japan	1.72	1.44	0.05	0.23	1.03	0.92	0.11	0.00	-0.43	-0.43	0.10	-0.10	-1.42	-1.28	-0.01	-0.14

Note: changes in the inequality index between initial and final year (RIF contributions). T=Total, B=Distributional effect between countries, W= Distributional effect within countries, C=Composition effect (change in population share).

Source: author's construction (see data section).

Table A5: Contribution to global income inequality: changes over time by geographical region and selected countries, Theil index (GE(1))

	1950–80				1980–90				1990–2000				2000–20			
	T	B	W	C	T	B	W	C	T	B	W	C	T	B	W	C
World	2.82	4.85	-10.41	8.38	2.41	-1.86	1.71	2.56	-1.33	-6.42	2.88	2.22	-24.74	-28.19	-0.62	4.07
North America	-4.38	-4.37	-0.07	0.06	1.93	1.29	0.36	0.27	2.28	1.69	0.35	0.25	0.19	-0.21	0.26	0.14
United States	-4.26	-4.27	-0.05	0.06	1.94	1.29	0.39	0.26	2.19	1.62	0.33	0.24	0.10	-0.29	0.25	0.13
Latin America and the Caribbean	-0.24	-0.09	-0.65	0.50	0.69	0.69	0.06	-0.06	0.24	0.25	-0.03	0.03	-0.76	0.68	-1.29	-0.16
Brazil	-0.30	-0.32	-0.22	0.25	0.27	0.23	0.03	0.00	-0.09	0.10	-0.19	0.00	-0.32	0.26	-0.47	-0.10
Mexico	-0.25	-0.06	-0.29	0.11	0.16	0.07	0.08	0.00	0.07	0.05	0.02	0.01	-0.17	0.23	-0.38	-0.01
Europe and Central Asia	-1.18	-0.07	-0.52	-0.59	1.89	1.04	0.59	0.27	2.62	2.83	0.50	-0.72	-1.05	-0.47	-0.14	-0.44
Germany	0.79	0.88	-0.07	-0.02	-0.01	-0.07	0.00	0.06	0.11	0.13	-0.02	0.00	0.27	0.15	0.18	-0.07
Russia	0.00	0.05	0.07	-0.12	0.77	0.17	0.66	-0.05	0.30	0.36	0.08	-0.14	-0.32	0.15	-0.38	-0.09
Middle East and North Africa	1.46	0.09	-0.12	1.49	-0.84	-1.00	-0.18	0.34	0.11	-0.09	-0.03	0.24	0.27	-0.11	-0.08	0.45
Sub-Saharan Africa	2.60	1.56	-0.67	1.71	1.97	0.72	0.04	1.20	2.14	0.75	-0.45	1.83	1.80	-2.21	-0.49	4.50
Nigeria	0.20	0.39	-0.30	0.10	0.44	0.24	0.08	0.12	0.35	0.28	-0.17	0.23	-0.01	-0.32	-0.25	0.56
South Asia	5.33	4.23	-1.22	2.32	-0.22	-1.11	-0.22	1.11	0.24	-2.57	1.06	1.75	-6.94	-8.77	0.76	1.07
Bangladesh	0.97	0.60	-0.07	0.44	0.21	-0.05	0.07	0.19	0.11	-0.17	0.09	0.20	-0.80	-0.93	0.09	0.03
India	3.55	3.06	-1.04	1.53	-0.45	-0.91	-0.29	0.75	-0.39	-2.36	0.95	1.02	-6.09	-7.20	0.73	0.37
Pakistan	0.50	0.23	-0.06	0.33	0.12	-0.15	0.01	0.26	0.34	0.02	0.00	0.32	0.11	-0.34	-0.05	0.49
East Asia and the Pacific	-0.77	3.49	-7.16	2.90	-3.01	-3.49	1.05	-0.56	-8.97	-9.28	1.48	-1.16	-18.24	-17.11	0.36	-1.50
China	-0.18	4.76	-6.49	1.55	-2.70	-2.99	0.98	-0.70	-8.69	-8.83	1.41	-1.27	-16.24	-15.39	0.46	-1.31
Indonesia	0.48	0.11	-0.06	0.42	-0.37	-0.30	-0.03	-0.04	-0.25	-0.17	-0.05	-0.03	-0.85	-0.99	0.20	-0.05
Japan	-1.55	-1.25	-0.25	-0.06	0.84	0.64	0.11	0.09	0.20	0.05	0.15	0.00	0.15	0.11	0.13	-0.08

Note: changes in the inequality index between initial and final year (RIF contributions). T=Total, B=Distributional effect between countries, W= Distributional effect within countries, C=Composition effect (change in population share).

Source: author's construction (see data section).

Appendix 4 – DATA

Table A6. Countries included in the study

Region	Country	First year	Final year	N survey years
N America	Bermuda			
N America	Canada	1966	2018	31
N America	United States	1950	2020	57
Latin America & C	Anguilla			
Latin America & C	Antigua and Barbuda			
Latin America & C	Argentina	1953	2020	41
Latin America & C	Aruba			
Latin America & C	Bahamas, The	1970	2013	3
Latin America & C	Barbados	1952	2010	3
Latin America & C	Belize	1993	1999	6
Latin America & C	Bolivia	1968	2020	25
Latin America & C	Brazil	1976	2020	32
Latin America & C	British Virgin Islands			
Latin America & C	Cayman Islands			
Latin America & C	Chile	1968	2020	16
Latin America & C	Colombia	1964	2020	25
Latin America & C	Costa Rica	1969	2020	34
Latin America & C	Cuba	1953	1953	1
Latin America & C	Curacao			
Latin America & C	Dominica	2008	2008	1
Latin America & C	Dominican Republic	1969	2020	28
Latin America & C	Ecuador	1968	2020	26
Latin America & C	El Salvador	1965	2020	27
Latin America & C	Grenada	2008	2008	1
Latin America & C	Guatemala	1979	2014	10
Latin America & C	Guyana	1993	1998	2
Latin America & C	Haiti	2001	2012	2
Latin America & C	Honduras	1968	2019	20
Latin America & C	Jamaica	1958	2015	29
Latin America & C	Mexico	1950	2020	24
Latin America & C	Montserrat			
Latin America & C	Nicaragua	1993	2014	6
Latin America & C	Panama	1962	2019	25
Latin America & C	Paraguay	1983	2020	27
Latin America & C	Peru	1972	2020	16
Latin America & C	Puerto Rico	1953	2003	7
Latin America & C	Saint Kitts and Nevis			
Latin America & C	Saint Lucia	1995	2016	2
Latin America & C	Saint Vincent and the Grenadines			
Latin America & C	Sint Maarten (Dutch part)			
Latin America & C	Suriname	1962	1999	2

Latin America & C	Trinidad and Tobago	1958	1992	6
Latin America & C	Turks and Caicos Islands			
Latin America & C	Uruguay	1961	2020	34
Latin America & C	Venezuela	1981	2014	23
Europe & C Asia	Albania	1996	2020	12
Europe & C Asia	Andorra	2003	2016	2
Europe & C Asia	Armenia	1996	2020	22
Europe & C Asia	Austria	1987	2020	21
Europe & C Asia	Azerbaijan	1995	2018	8
Europe & C Asia	Belarus	1988	2020	25
Europe & C Asia	Belgium	1979	2020	24
Europe & C Asia	Bosnia and Herzegovina	2001	2011	4
Europe & C Asia	Bulgaria	1963	2020	47
Europe & C Asia	Croatia	1988	2020	18
Europe & C Asia	Cyprus	2005	2020	16
Europe & C Asia	Czechia	1993	2020	11
Europe & C Asia	Denmark	1976	2020	14
Europe & C Asia	Estonia	1992	2020	11
Europe & C Asia	Finland	1962	2020	17
Europe & C Asia	France	1962	2020	31
Europe & C Asia	Georgia	1996	2019	24
Europe & C Asia	Germany	1973	2019	39
Europe & C Asia	Greece	1957	2020	12
Europe & C Asia	Greenland	2002	2018	17
Europe & C Asia	Hungary	1962	2020	21
Europe & C Asia	Iceland	2004	2018	11
Europe & C Asia	Ireland	1973	2020	25
Europe & C Asia	Italy	1948	2019	33
Europe & C Asia	Kazakhstan	1993	2018	20
Europe & C Asia	Kosovo	2003	2018	12
Europe & C Asia	Kyrgyzstan	1993	2020	25
Europe & C Asia	Latvia	1993	2020	23
Europe & C Asia	Liechtenstein			
Europe & C Asia	Lithuania	1993	2019	16
Europe & C Asia	Luxembourg	1985	2020	15
Europe & C Asia	Moldova	1993	2019	24
Europe & C Asia	Monaco			
Europe & C Asia	Montenegro	2005	2020	15
Europe & C Asia	Netherlands	1962	2020	17
Europe & C Asia	North Macedonia	1994	2019	23
Europe & C Asia	Norway	1963	2020	16
Europe & C Asia	Poland	1986	2020	21
Europe & C Asia	Portugal	1973	2020	29
Europe & C Asia	Romania	1989	2020	19
Europe & C Asia	Russia	1988	2020	18
Europe & C Asia	San Marino			
Europe & C Asia	Serbia	2006	2020	8
Europe & C Asia	Slovakia	1988	2020	13

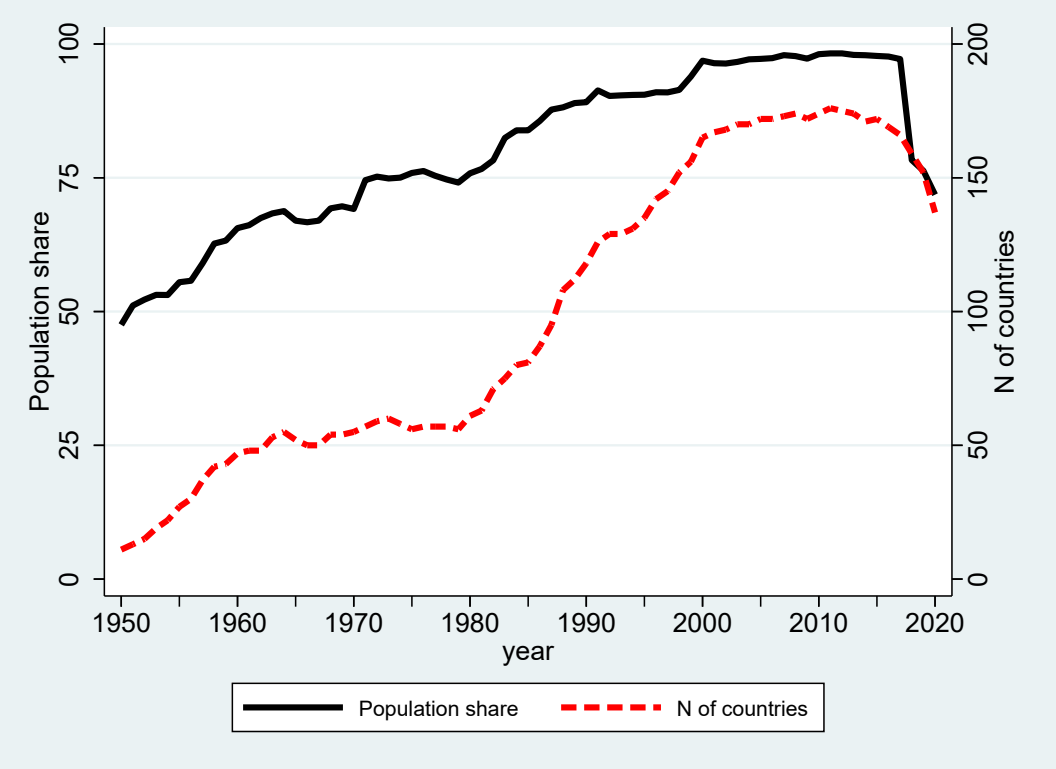
Europe & C Asia	Slovenia	1987	2020	14
Europe & C Asia	Spain	1965	2020	15
Europe & C Asia	Sweden	1963	2020	24
Europe & C Asia	Switzerland	1982	2019	18
Europe & C Asia	Tajikistan	1999	2015	6
Europe & C Asia	Turkey	1968	2020	23
Europe & C Asia	Turkmenistan	1993	1998	2
Europe & C Asia	Ukraine	1988	2020	25
Europe & C Asia	United Kingdom	1960	2019	32
Europe & C Asia	Uzbekistan	1989	2003	6
Middle East & N Africa	Algeria	1988	2012	3
Middle East & N Africa	Bahrain			
Middle East & N Africa	Djibouti	1996	2017	5
Middle East & N Africa	Egypt	1965	2018	11
Middle East & N Africa	Iran	1986	2020	14
Middle East & N Africa	Iraq	1956	2013	4
Middle East & N Africa	Israel	1980	2018	22
Middle East & N Africa	Jordan	1987	2014	8
Middle East & N Africa	Kuwait	1973	2000	3
Middle East & N Africa	Lebanon	1960	2012	2
Middle East & N Africa	Libya			
Middle East & N Africa	Malta	2005	2020	16
Middle East & N Africa	Morocco	1965	2014	8
Middle East & N Africa	Oman	2000	2011	2
Middle East & N Africa	Qatar			
Middle East & N Africa	Saudi Arabia			
Middle East & N Africa	Syria	1997	2007	3
Middle East & N Africa	Tunisia	1961	2016	9
Middle East & N Africa	United Arab Emirates	2015	2019	2
Middle East & N Africa	West Bank and Gaza	1996	2017	11
Middle East & N Africa	Yemen	1992	2014	4
Sub-Saharan Africa	Angola	2001	2019	3
Sub-Saharan Africa	Benin	1959	2019	5
Sub-Saharan Africa	Botswana	1986	2016	5
Sub-Saharan Africa	Burkina Faso	1995	2019	6
Sub-Saharan Africa	Burundi	1992	2014	4
Sub-Saharan Africa	Cameroon	1996	2014	4
Sub-Saharan Africa	Cape Verde	2002	2015	3
Sub-Saharan Africa	Central African Republic	1993	2008	3
Sub-Saharan Africa	Chad	1958	2019	4
Sub-Saharan Africa	Comoros	2004	2014	2
Sub-Saharan Africa	Congo, Democratic Republic of the	2005	2013	2
Sub-Saharan Africa	Congo, Republic of the	2005	2012	2
Sub-Saharan Africa	Cote d'Ivoire	1959	2019	12
Sub-Saharan Africa	Equatorial Guinea	2006	2006	1
Sub-Saharan Africa	Eritrea	1997	1997	1
Sub-Saharan Africa	Eswatini	1995	2017	4
Sub-Saharan Africa	Ethiopia	1996	2016	5

Sub-Saharan Africa	Gabon	1975	2017	4
Sub-Saharan Africa	Gambia, The	1992	2016	7
Sub-Saharan Africa	Ghana	1988	2017	7
Sub-Saharan Africa	Guinea	1991	2019	6
Sub-Saharan Africa	Guinea-Bissau	1991	2019	5
Sub-Saharan Africa	Kenya	1977	2016	6
Sub-Saharan Africa	Lesotho	1987	2018	5
Sub-Saharan Africa	Liberia	2007	2016	3
Sub-Saharan Africa	Madagascar	1960	2013	9
Sub-Saharan Africa	Malawi	1969	2020	9
Sub-Saharan Africa	Mali	1989	2020	12
Sub-Saharan Africa	Mauritania	1987	2014	7
Sub-Saharan Africa	Mauritius	2007	2017	3
Sub-Saharan Africa	Mozambique	1997	2015	4
Sub-Saharan Africa	Namibia	1994	2016	4
Sub-Saharan Africa	Niger	1960	2019	8
Sub-Saharan Africa	Nigeria	1959	2019	8
Sub-Saharan Africa	Rwanda	1985	2017	6
Sub-Saharan Africa	Sao Tome and Principe	2001	2017	3
Sub-Saharan Africa	Senegal	1961	2019	7
Sub-Saharan Africa	Seychelles	2000	2019	4
Sub-Saharan Africa	Sierra Leone	1969	2018	5
Sub-Saharan Africa	Somalia	2002	2016	2
Sub-Saharan Africa	South Africa	1993	2017	10
Sub-Saharan Africa	South Sudan	2009	2009	1
Sub-Saharan Africa	Sudan	1969	2014	3
Sub-Saharan Africa	Tanzania	1964	2018	8
Sub-Saharan Africa	Togo	2006	2019	4
Sub-Saharan Africa	Uganda	1989	2020	10
Sub-Saharan Africa	Zambia	1959	2015	11
Sub-Saharan Africa	Zimbabwe	1995	2017	3
South Asia	Afghanistan	2008	2017	3
South Asia	Bangladesh	1963	2016	11
South Asia	Bhutan	2003	2017	4
South Asia	India	1951	2012	33
South Asia	Maldives	2003	2020	4
South Asia	Nepal	1977	2011	4
South Asia	Pakistan	1963	2019	23
South Asia	Sri Lanka	1953	2016	13
E Asia & Pacific	Australia	1969	2018	16
E Asia & Pacific	Brunei	2005	2016	3
E Asia & Pacific	Cambodia	1994	2012	10
E Asia & Pacific	China	1953	2020	20
E Asia & Pacific	Fiji	1968	2020	7
E Asia & Pacific	Hong Kong	1963	2016	13
E Asia & Pacific	Indonesia	1976	2020	32
E Asia & Pacific	Japan	1956	2014	26
E Asia & Pacific	Kiribati	2006	2020	2

E Asia & Pacific	Korea, DPR			
E Asia & Pacific	Korea, Republic of	1992	2016	11
E Asia & Pacific	Laos	1993	2019	6
E Asia & Pacific	Macao			
E Asia & Pacific	Malaysia	1960	2017	17
E Asia & Pacific	Marshall Islands	2020	2020	1
E Asia & Pacific	Micronesia, Federated States of	2000	2013	3
E Asia & Pacific	Mongolia	1995	2018	10
E Asia & Pacific	Myanmar	1958	2017	3
E Asia & Pacific	Nauru	2013	2013	1
E Asia & Pacific	New Zealand	1973	2018	28
E Asia & Pacific	Palau	2014	2014	1
E Asia & Pacific	Papua New Guinea	1996	2010	2
E Asia & Pacific	Philippines	1957	2018	16
E Asia & Pacific	Samoa	2002	2014	3
E Asia & Pacific	Singapore	2003	2012	6
E Asia & Pacific	Solomon Islands	2006	2013	2
E Asia & Pacific	Taiwan	1953	2016	24
E Asia & Pacific	Thailand	1962	2020	29
E Asia & Pacific	Timor-Leste	2001	2014	3
E Asia & Pacific	Tonga	2001	2015	3
E Asia & Pacific	Tuvalu	2010	2010	1
E Asia & Pacific	Vanuatu	2010	2020	2
E Asia & Pacific	Vietnam	1993	2018	11

Source: Author's construction (see data sections). Countries with empty cells, are imputed based on data from the same region and income group (except Korea, DPR: all percentiles with same income).

Figure A6. Population and country coverage with surveys within 5 years in the global dataset (WIID companion)



Source: Author's construction (see data sections).